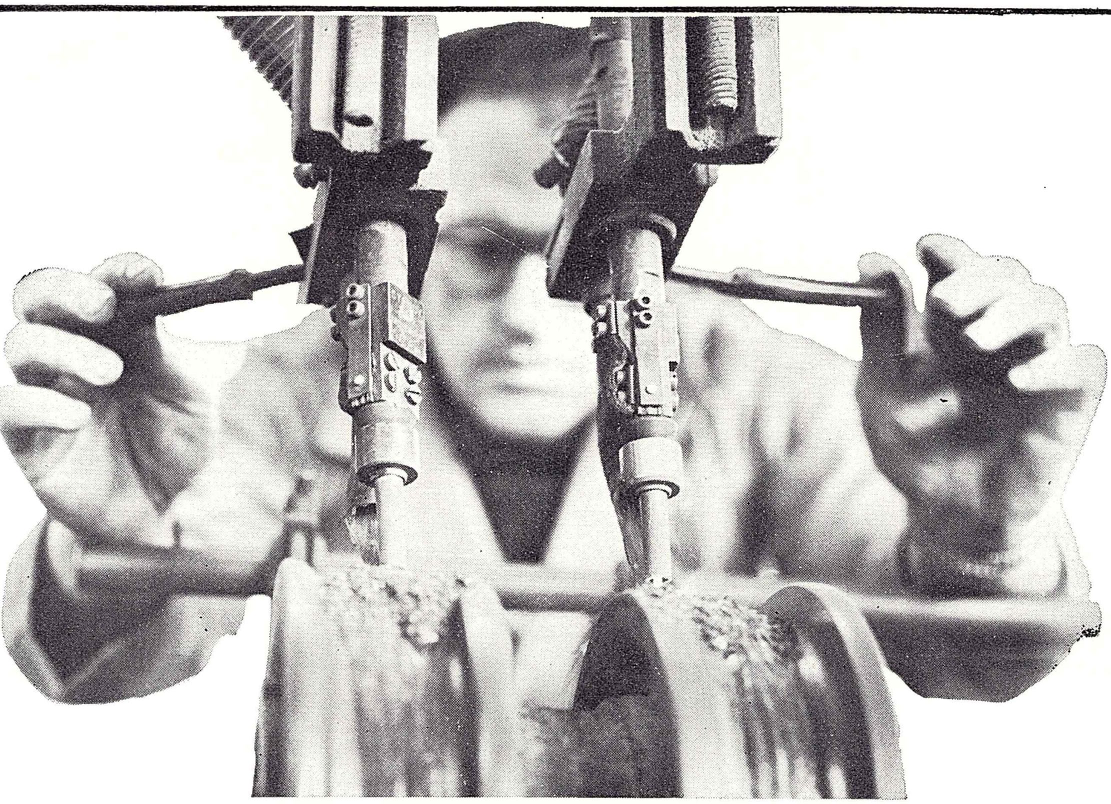
Jones

NEW ZEALAND Coal

Vol. 17: No. 4· Spring, 1973.



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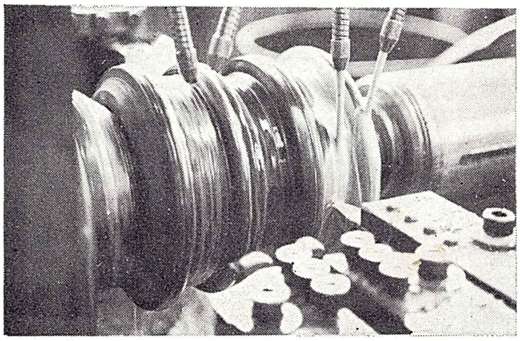

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NEW ZEALAND
COAL

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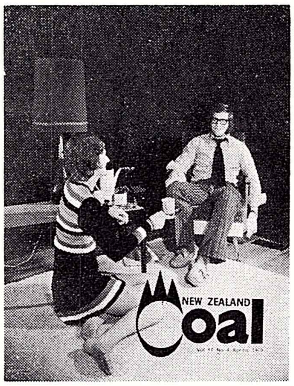
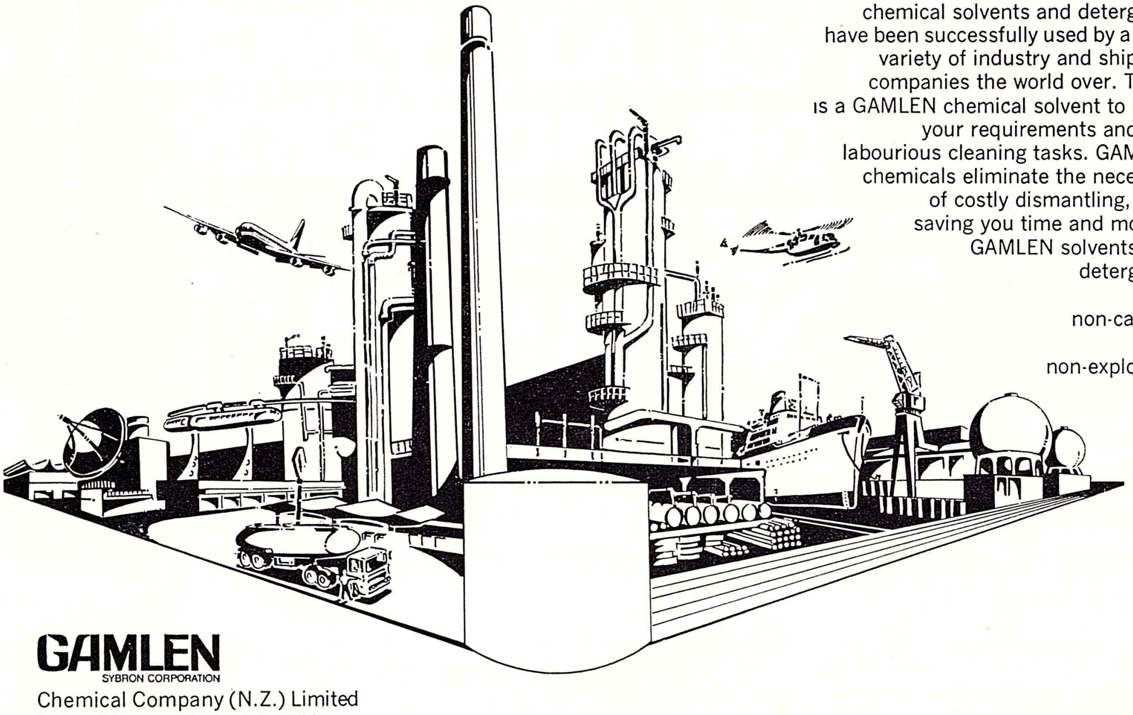


OUR COVER PICTURE

Cosy coal comfort in the modern home: only a floor vent intrudes into living space, to bring automatically-fired and controlled coal heat from the basement appliance.



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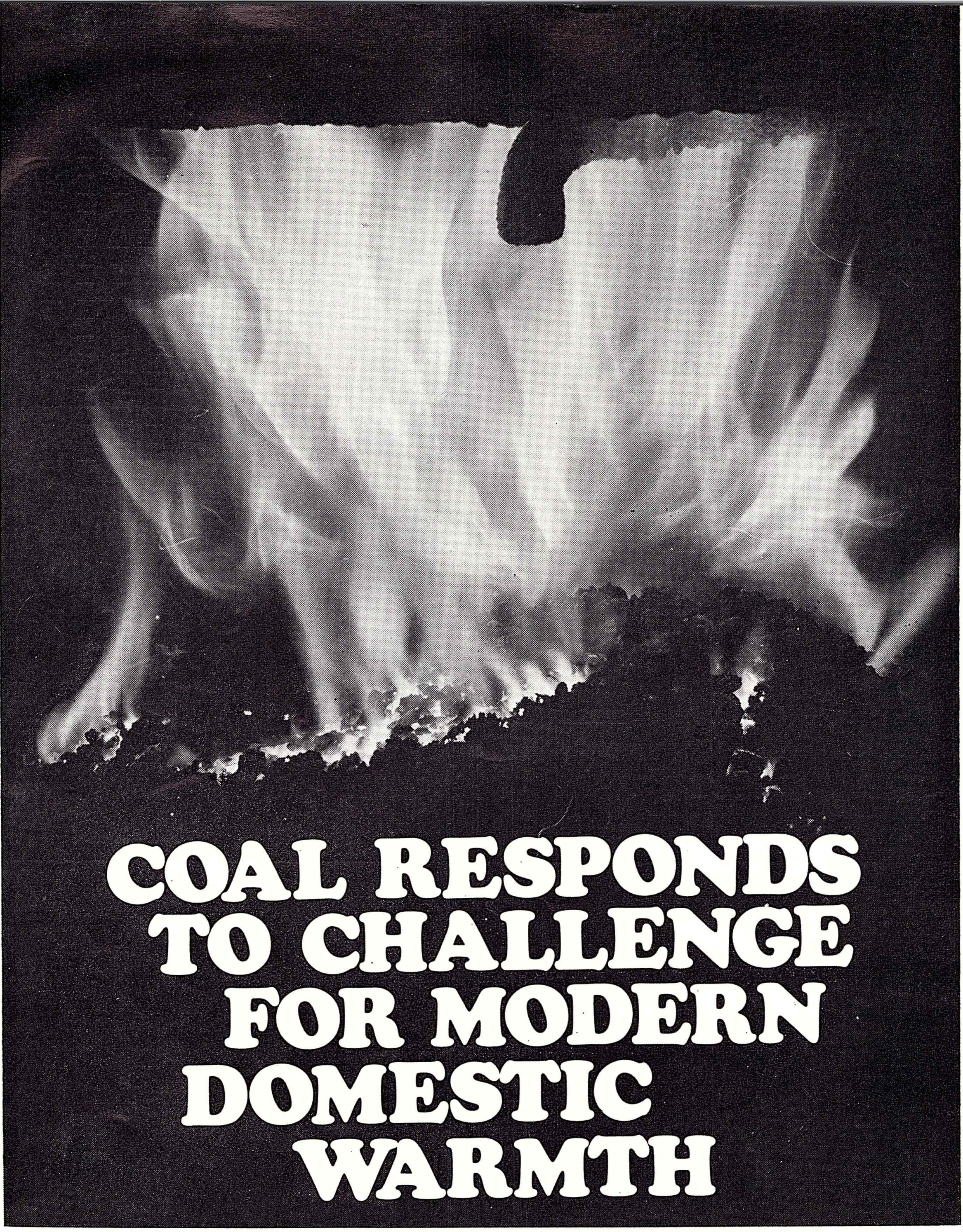


COAL RESPONDS TO CHALLENGE FOR MODERN DOMESTIC WARMTH

The Director of Coal Research, Mr. P. A. Toynbee, reviews the variety of modern coal-fired domestic appliances available or now being completed in New Zealand as coal responds to the need for home heating against the background of an increasing demand for energy

Modern domestic heating has come a long way from the caveman days when smoke from an unenclosed fire in the centre of the living space curled upwards and out through a vent in the ceiling. Yet, somehow, the indefinable attraction of the liveliness of flames persists where most of the facets of caveman days have long since been forgotten.

The fumes from those early fires may have led to an improved control of combustion and to the development of a crude form of the open fire we have today.

The original open fire was inherently an inefficient appliance — in many cases less than 20 per cent of the heat of the fuel ended up as effective heat in the room. Gradually technologists learnt about the com-

Today's "affluent society" will not put up with discomforts that past generations would tolerate. The coal range that once glowed all day and kept a kitchen pleasantly warm has been superseded by the "touch of a switch" gas or electric cooker. School rooms; where a red-hot stove would roast those next to it while the rest of the class were barely warm, have changed to central heating. Large commercial blocks, centrally heated, have replaced small business offices once warmed with a fireplace.

Men's clothes are of lighter material, lasting less time between fashion changes, and giving a new freedom, but not providing former degrees of warmth. Women's clothing has the same trend.

Demands for more business and domestic heating have been paralleled by extra calls for energy for increased mechanisation of industry — demands increasing more quickly than the population or the normal growth rate of energy resources. Simultaneously the energy demand requires more development of resources, in turn adding to the price of energy.

Coal has two things to offer in these circumstances.

Immense reserves that make it comparatively less costly to the consumer as the costs of other energy resources escalate.

Improved appliances offering far more heat — better controlled — per sack of coal than the old open-grate fireplace.

Facing the challenge of competition, coal responds by presenting these new appliances. In this way it capitalises on its inherent price advantage as it returns to the home with a new, modern image.

bustion process. They learnt to limit the quantity of air flowing up the chimney; although these excessive air flows ensured adequate ventilation and prevented any stuffiness in the room, too much heat was being carried from the fire up the chimney. Low efficiencies meant not only an increased operating cost but also more effort in the frequent tending of the fire — so fireplaces were developed, in which the flow of air up the chimney was restricted and thermal efficiencies rose.

Even higher efficiencies resulted by reducing further the quantities of air passing up the chimney and by enclosing the fire as in a closed space heater. The friendly view of the fire was kept naturally and simply — a feature that manufacturers of appliances using other fuels try to emulate.

Dependence

New Zealand's growing dependence on coal for energy supplies is making people realise what coal contributes to New Zealand's energy needs.

The modern coal-fired appliances, and improvement in the grades of low-sulphur coal, all point to a re-awakening in the industry.

The coal industry must grow if only because, in New Zealand and everywhere else in the world, the dwindling supply of alternative forms of energy is becoming more embarrassing. Everywhere, the fuel that is available is coal, and as the world demand for oil products comes to exceed the availability of crude oil, and as the problems of providing electricity increase, coal is sure of a new place in the sun.

The problems in meeting madly-escalating demands for electricity are the most serious ones today on the fuel and power scene. When our available hydroelectric potential is fully exploited further expansion in electricity supply will have to be made, mainly from thermal stations burning coal or oil or natural gas. This grossly-inefficient power generation process will mean dearer electricity and it will rapidly expand the demand for the primary fuels.

The problems in electricity development are illustrated by a statement, some 10 years ago, by the General Manager of the N.Z. Electricity Department, that it cost the government and local bodies £200 to provide each kilowatt of peak demand. We can be sure that his figure has now escalated to $500 per kilowatt — this means that electric space heating in a house needing a modest 5 kilowatts, would cost $2,500. Obviously these conditions have to be changed.

One-half of the country's total electricity consumption goes in domestic water and space heating. It is in this area that effective steps should be taken to halt or even reverse the increasing demands for power. The wisest national fuel policy would encourage the increased use of other fuels in place of domestic electricity; this, of course, applies to gas and oil as well as to coal, but coal has a good head start in that recent development in coal-fired appliances have concentrated on those providing both space heating and water heating.

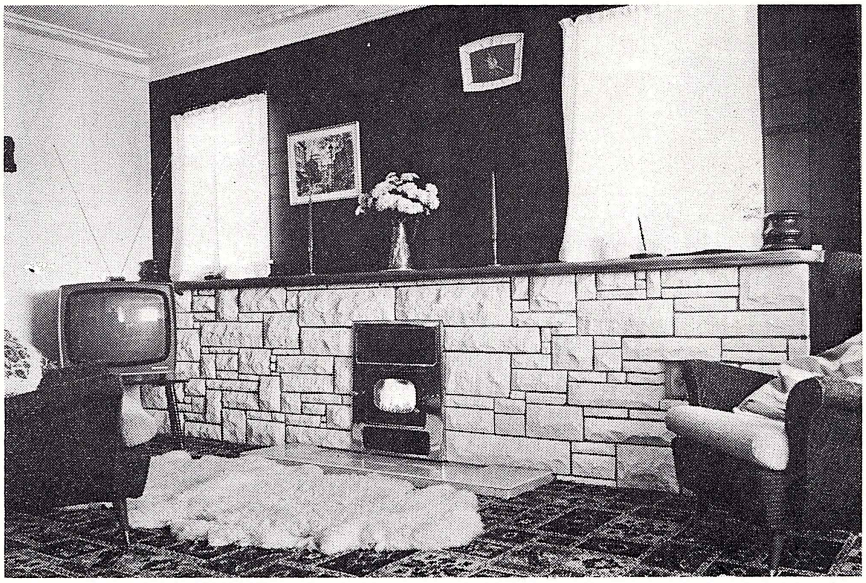
The Environment

From time to time we see statements, clouded with emotion, made by laymen about air pollution. These simply confuse other laymen. Often there seems to be no clear appreciation of just what air pollution is.

Obviously it is technically possible to prevent all pollution but at such high capital cost that it just simply could not be considered.

Less practical folk could say "Let's use only electricity for domestic heating", without any sense of the utter impracticability of such a course. Again, people who mistakenly see coal as the arch villain in these problems of air pollution could say "Let's do away with coal completely", without understanding how impossible this is from consideration of the national economy.

The coal industry is concerned



The living heat of coal.

Coal-warmed relaxation.

One of the models of Visor contemporary fireplaces, designed to blend with modern decor while providing efficiency with economy.

about the poor publicity it often receives in matters of air pollution. So often the image of coal has been mistakenly that of a dirty, outmoded fuel, an image that springs from old-fashioned equipment installed years ago, and from retaining some coal-firing methods that seem not to have changed since the industrial revolution.

Because of improved modern firing methods, these conditions are changing. Gradually coal is earning for itself a new look — a new image which augurs a prosperous future.

The industry realises that, if coal is to expand its share of the heating load, it must consider criticism of its failures in the past and set about improving, using public opinion as a guide to its future prosperity.

Improving

The coal industry has done, and is continuing to do, much towards this. Improved grades of coal are becoming available and care is being taken to ensure that low-sulphur coals are available on the market. Householders are being shown the correct methods of tending a fire, efforts which have contributed much to a better control of smoke emission.

Appliances that can burn coal smokelessly are perhaps the most important feature of this work. In modern coal-fired appliances, designed to suit the coal being burnt, smokefree combustion can be assured. These developments are continuing, the research facilities of the coal industry being available to help any manufacturer to develop appliances acceptable to clean air authorities.

Open fires do offend in smoke emission. They are however, steadily becoming fewer, mainly because of their relatively low thermal efficiency. The trend away from the open fire will develop easily and naturally without the need for any prohibition, and will bring a steady and continuing reduction in the volume of air pollution emanating from domestic hearths.

Space Heaters

Space heaters in place of open fires eliminate much of the smoke from domestic heating. This is because higher efficiency ensures a consumption of coal of only one-third to one-half of that needed on an open fire for the same level of comfort, and because the higher temperatures of the enclosed combustion chamber ensure more complete combustion.

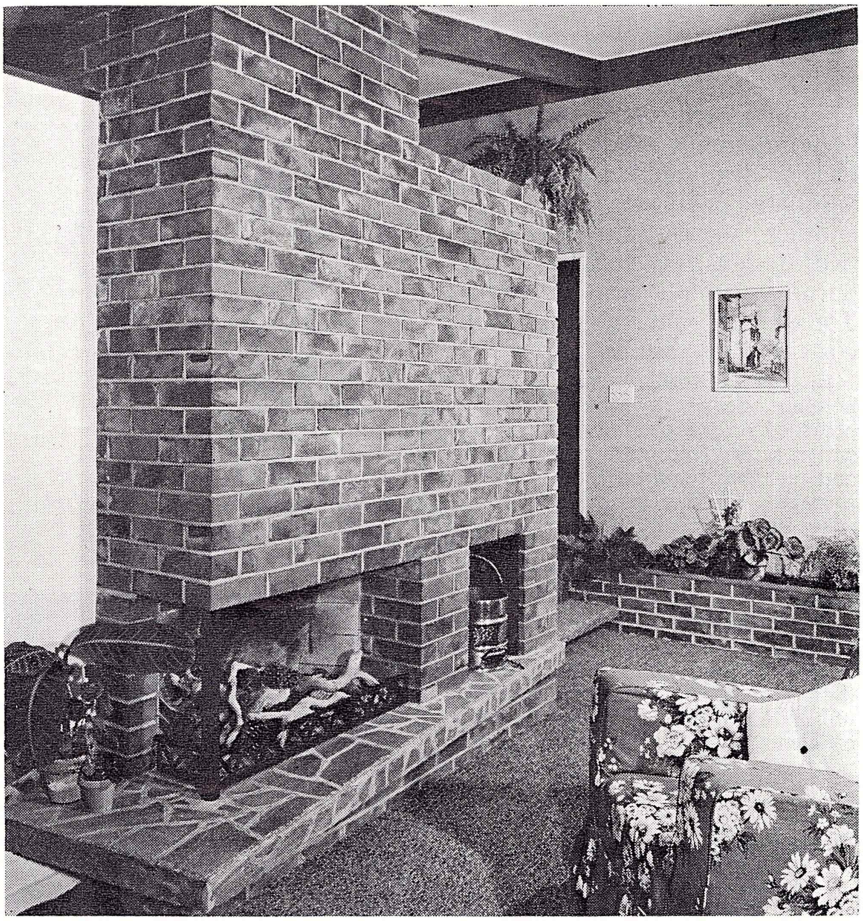
A wide variety of space heaters is available today, generally with wet-back attachments, some free-standing, some inbuilt. Variation in appearance, shape and colour all offer their own attraction to suit individual requirements. Models available are listed in the table, which includes details, costs and installation costs, etc.

New Developments

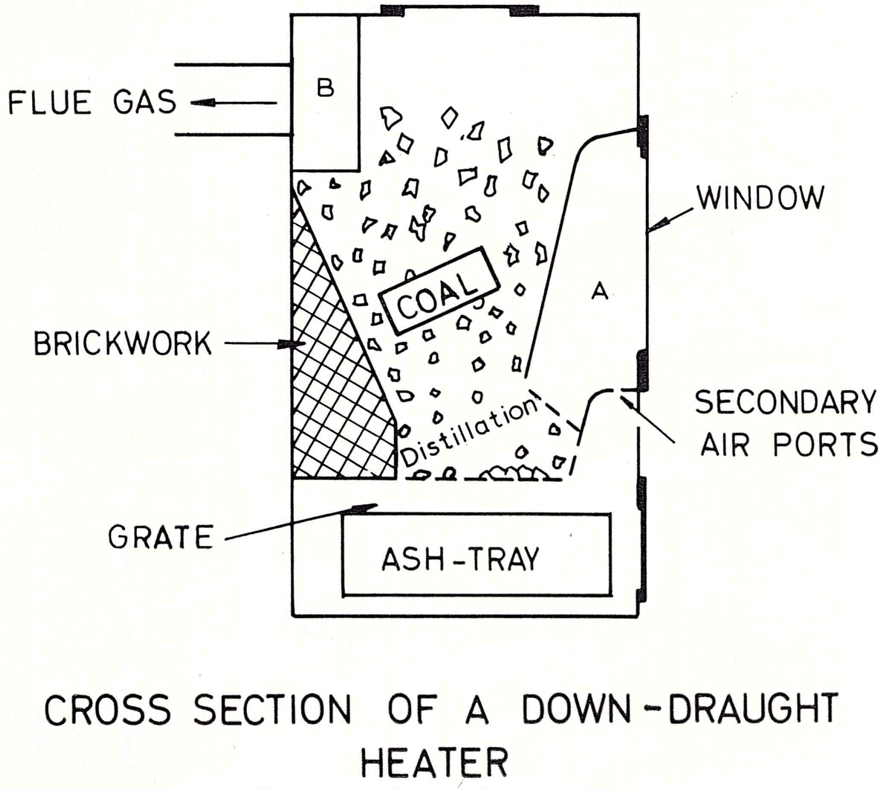
New developments in smokeless appliances such as the Juno, the Smoke Eater, the Heatamatic and the Ohai O3MW are now described.

JUNO: Some five years ago, a range of down-draught space heaters used in Germany with coals that are rather similar to our sub-bituminous coals was imported and tested by N.Z. Coal Research Association. The most effective of these heaters was selected and the Juno, now manufactured in New Zealand, is enjoying great popularity.

How the Juno heater works is illustrated in the diagram. The coal, in an internal magazine, is sufficient to last a normal day. It feeds down as it is consumed and, as it approaches the grate, it is heated from the combustion below. Air passes up through the grate, burning the coal, and the heat generated releases combustibles and volatiles from the fuel. Part of the air passes as secondary air into the combustion chamber (A), where all the volatile constituents, including the smoke released from the coal, are burnt in a gas-like flame behind a glass window. The flue gases pass from the combustion chamber, around passages on each side of the heater, into the flueway (B) across the back of the heater, and thus into the flue-gas uptake.



Coal warmth combines with modernity in today's home.



Cross section of a Juno down-draught heater.

The distillation zone of the coal is shown in the diagram. The volatile constituents evolved must pass through the hot burning char below, and into the combustion chamber where sufficient air, at sufficiently high temperatures, ensures complete combustion and absence of smoke.

In an open fire, flames can be extinguished by a fresh shovelful of coal. This simply cannot happen in these down-draught heaters. Sudden changes in the thermostat setting may cause some slight emission of smoke, but this disappears when the heater attains its "equilibrium condition".

The thermal efficiency of these heaters was measured in a series of tests: in no case did this efficiency fall below 70%. Apart from this high efficiency, the smokeless operation and the automatic control, there is this important feature: a lively flicker of flames behind the heat-resistant glass, offering all the attractions of an open fire to satisfy one who insists on being able to gaze at the flames!

SMOKE EATER: The Coal Research Association has now demonstrated the successful working on New Zealand coals of another down-draught

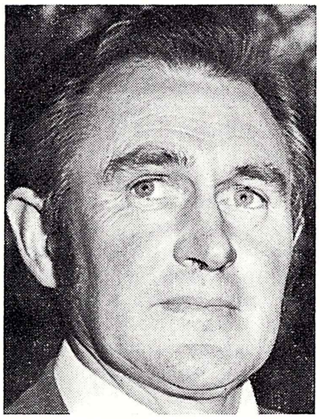
(Continued on page 54)

New coal heaters reduce cost and pollution

The colder climate in the south is more conducive to greater emphasis in home heating, and Southland engineers are achieving another success for coal with two designs of automatic coal burning central heating plants. The designs offer reduced heating costs and less air pollution.

In most installations, a bunker holding one or two tons of coal is provided on the outside of the house, and a screw feeds coal automatically and at the required rate into the furnace. The bunker is filled periodically by the coal supplier, and the householder need never see the coal once the lid on the bunker is down again.

These heaters use the relatively-cheap Ohai industrial dross. A price of $10 a ton equals 4.14 cents per therm or 0.14 cents per electrical unit. Allowing for the thermal efficiency of the appliance (about 70 per cent) the cost of the effective heat can be calculated as 0.20 cents per kWh.

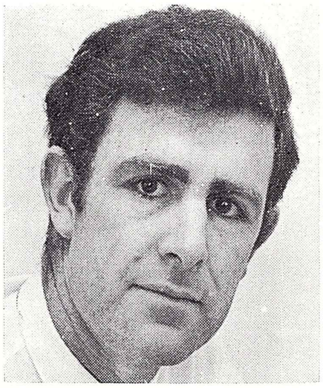


Mr J. Doherty, manufacturer of the "Heatamatic."

The Jim Doherty designed "Heatamatic" is a hot-water boiler using a small underfeed stoker. In this case house heating is effected by circulating water to radiators or skirting-board heaters. The Heatamatic was described in the February 1971 issue of "Coal".

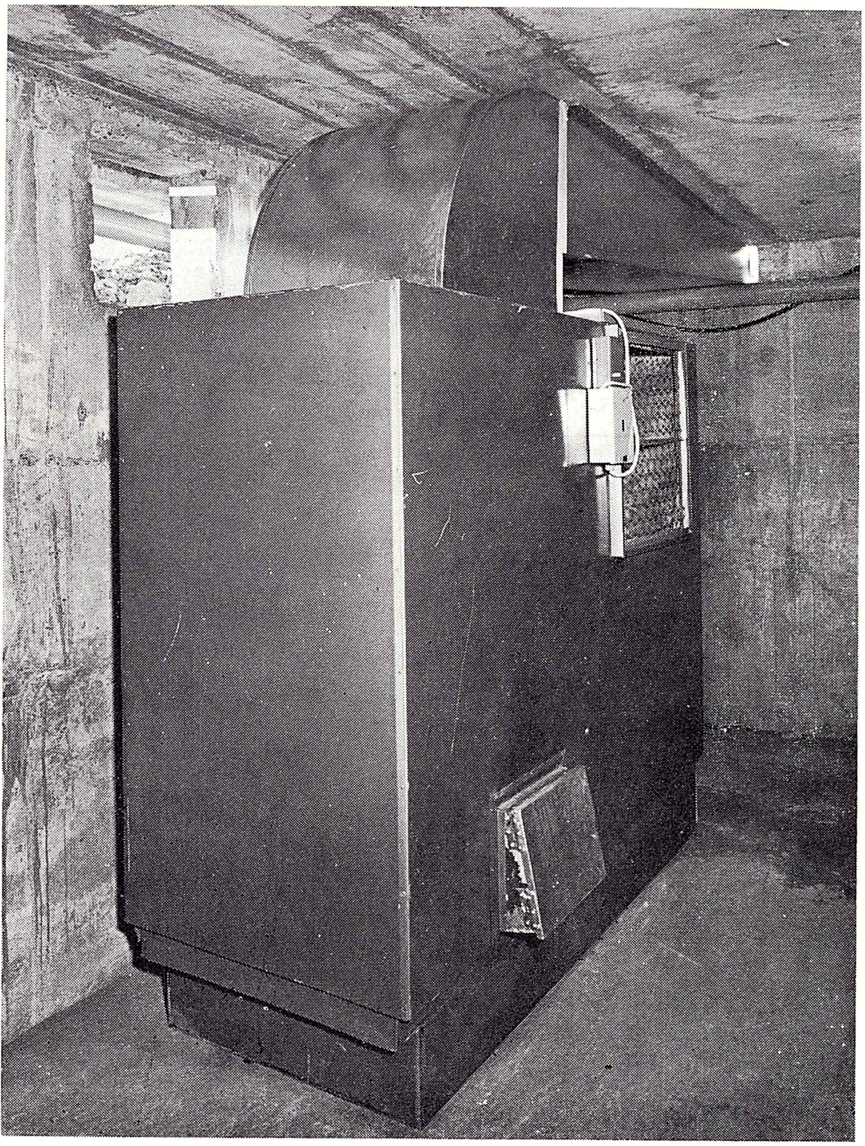
Ohai 03MW

John Fogarty and Noel Chilton have now applied a similar firing system to their "Ohai 03MW" air heater. Air is blown through a heat exchanger of ingenious design which sits above the combustion chamber. The hot air is distributed around the house, office or factory in steel ducts. This appliance is as up to date as the

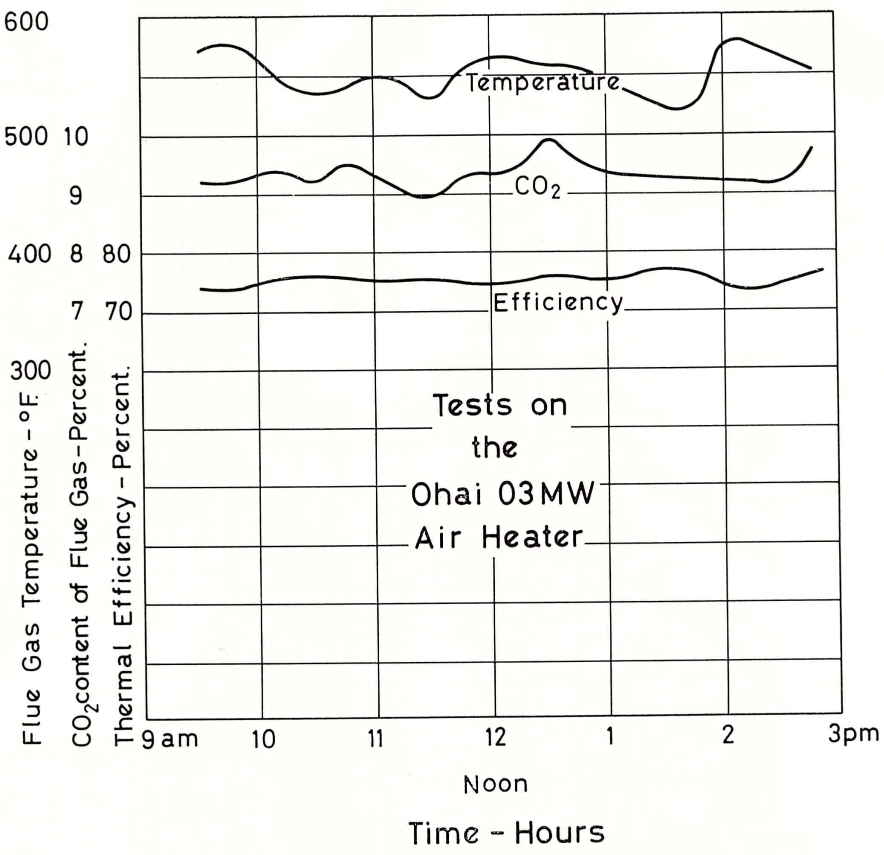


Mr J. Fogarty, manufacturer of the "Ohai O3MW".

Combustion in the Ohai O3MW



The Ohai O3MW, newly-designed coal-fired central heating unit.



expression of its model number in the new metric units of heat, 0.03MW.

Among them, these Southlanders have the coal-fire central heating field in Southland, and indeed in the whole of New Zealand, well and truly covered. Where a householder wants a hot-water system, coal can provide this with the "Heatamatic". When a hot-air system is preferred, there is the "Ohai 03MW".

In both heaters the underfeed combustion principle with over-fire air jets can ensure complete absence of smoke, and with the low-sulphur coals available, there is no risk of the operation offending the keepers of our pure air.

Combustion tests have been carried out by the N.Z. Coal Research Association on a prototype of the "Ohai 03MW" heater.

In summary, the tests have shown that the "Ohai 03MW" achieved a thermal efficiency of 74.8 per cent, and a heat output (as hot air) of 85,000 Btu/hr, equivalent to 25 kW. Smokeless combustion can be assured.

Description of the Heater

The "Ohai 03MW" uses a heat exchanger of heat-resistant steel to transfer heat from flue gases to a stream of air blown by a separate fan, through a heat exchanger to a ducted central-heating system. The heat exchanger is of simple but novel design on which patents are pending. The stoker is the same as that used in the "Heatamatic' 'boiler.

Procedure for Tests

The "Ohai 03MW" was run under normal operating conditions for some three hours before tests were started. Flue gas temperatures were measured and flue gases analysed over a 5½-hour period after stable conditions had been achieved. The thermal efficiency of the appliance was calculated from this data and the heat output assessed from the efficiency and the rate of coal consumption.

The coal used in the tests was a small grade of Ohai coal, riddlings from a local coal merchant's screening operations. The as-fired analysis of the coal is as follows:

Moisture	%	15.6
Ash	%	4.0
Volatile Matter	%	34.2
Fixed Carbon	%	46.2
Sulphur	%	0.26
Calorific Value	Btu/lb	10,790
	Mj/kg	25.10

Results

The average results over the test period are as follows:

Rate of coal consumption	10.6 lb/hr
Carbon Dioxide of flue gas	9.3%
Flue gas temperature	553°F
Thermal efficiency	74.8%
Thermal output	85,500 Btu.hr or 25 kW
Temperature increase in circulating air	770°F
Circulating air flow	1000 c.f.m.

The combustion conditions were relatively stable over the test period, the variations being illustrated in the figure.

Air Pollution

Special attention was paid to the appearance of the flue gases issuing from the stack. Under normal operation there was a complete absence of smoke, the smokeless operation being assured by the constant feed of coal up through the retort, and by the provision of an over-fire air jet in the combustion chamber.

Application

Interest in this type of heat is mounting rapidly, as consideration of home heating costs become more important, and as the populace is becoming more and more interested in appliances which can burn low-sulphur fuels smokelessly.

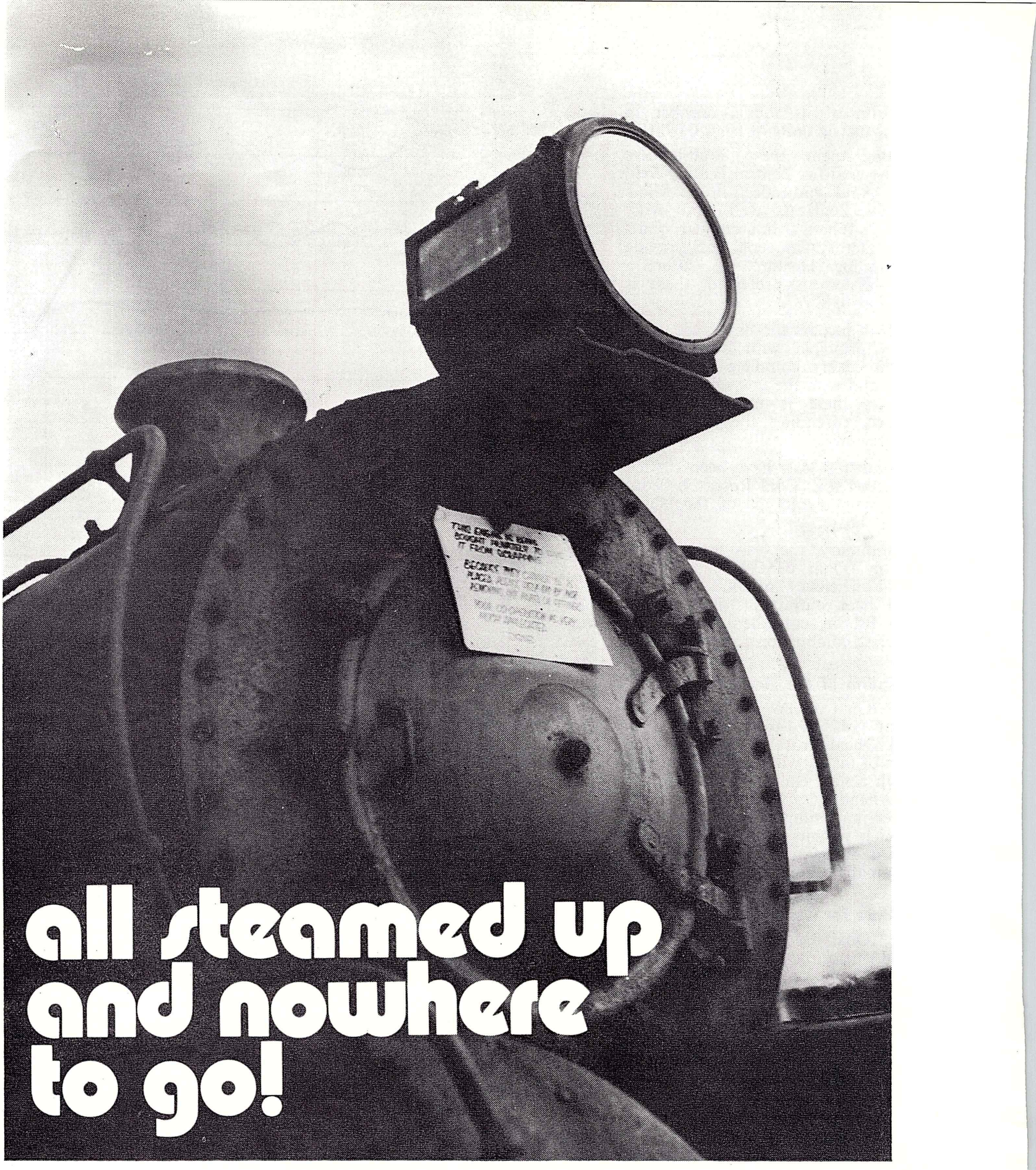
The Clean Air Act 1972, which came into force on April 1 of this year, provides for establishing clean air zones. In clean air zones more severe restrictions may be imposed on smoke emissions, such as domestic fires and rubbish burning.

The sale and use of fuels and combustion appliances which are not relatively pollution free may be prohibited in these areas.

Local authorities will be responsible for establishing clean air zones. They cannot be established until after April 1, 1975, but their introduction needs considerable work beforehand to prepare each scheme suited to a local situation. Objections, too, have to be considered.

The Department of Health has published "Clean Air", a pamphlet obtainable from local authorities or local offices of the Health Department.

The pamphlet, as the first of a series about the Clean Air Act 1972, summarises the obligations of householders, motorists, industry and agriculture and the responsibilities of local authorities and central government under the Act.



all steamed up and nowhere to go!

"She's all steamed up, but has nowhere to go!" Mr I. G. Douglas, public relations officer for the Ford Motor Co. (NZ) Ltd, told "Coal".

Mr Douglas was showing us an ex-NZR "J" engine, merrily steaming away while Mr Joe Smith, an NZR fireman on loan to Ford shovelled four to five tons of Waikato coal into the firebox each day.

One of the boilers at Ford's Lower Hutt factory had developed a fault, taking it out of commission for two or three weeks. At the end of June, Wellington's weather is such that remaining boiler capacity could have carried most essential steam services for the factory, without enough margin for all needs.

Jocularly, one of the plant engineers suggested a steam engine as a temporary means of raising enough steam to keep up the daily flow of 80 cars (100 on overtime days) and keep Ford's 1200-odd staff warm.

Joke

Almost a joke, the idea grew as its practicality emerged.

A coal-fired "J" had arrived in Wellington at Easter, destined for the steam railway museum the Railway Preservation Society is planning at Paekakariki.

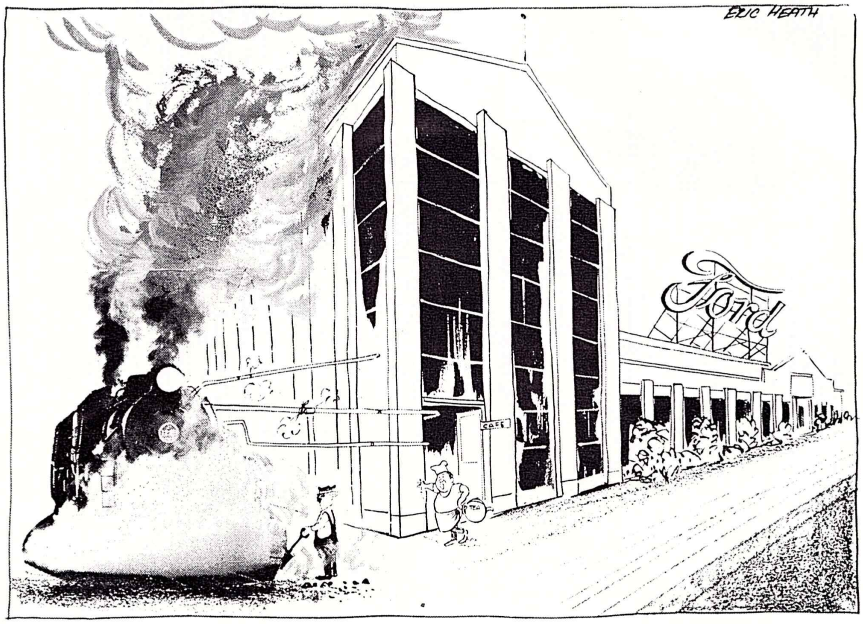
The Preservation Society, when approached, was delighted to hire out its engine and increase its funds for its museum.

Railway sidings leading into Ford's plant at Seaview Road, Lower Hutt, enabled the "J" to be taken from the Hutt workshops of the NZR (where it was being checked over) and set up in state alongside the car factory.

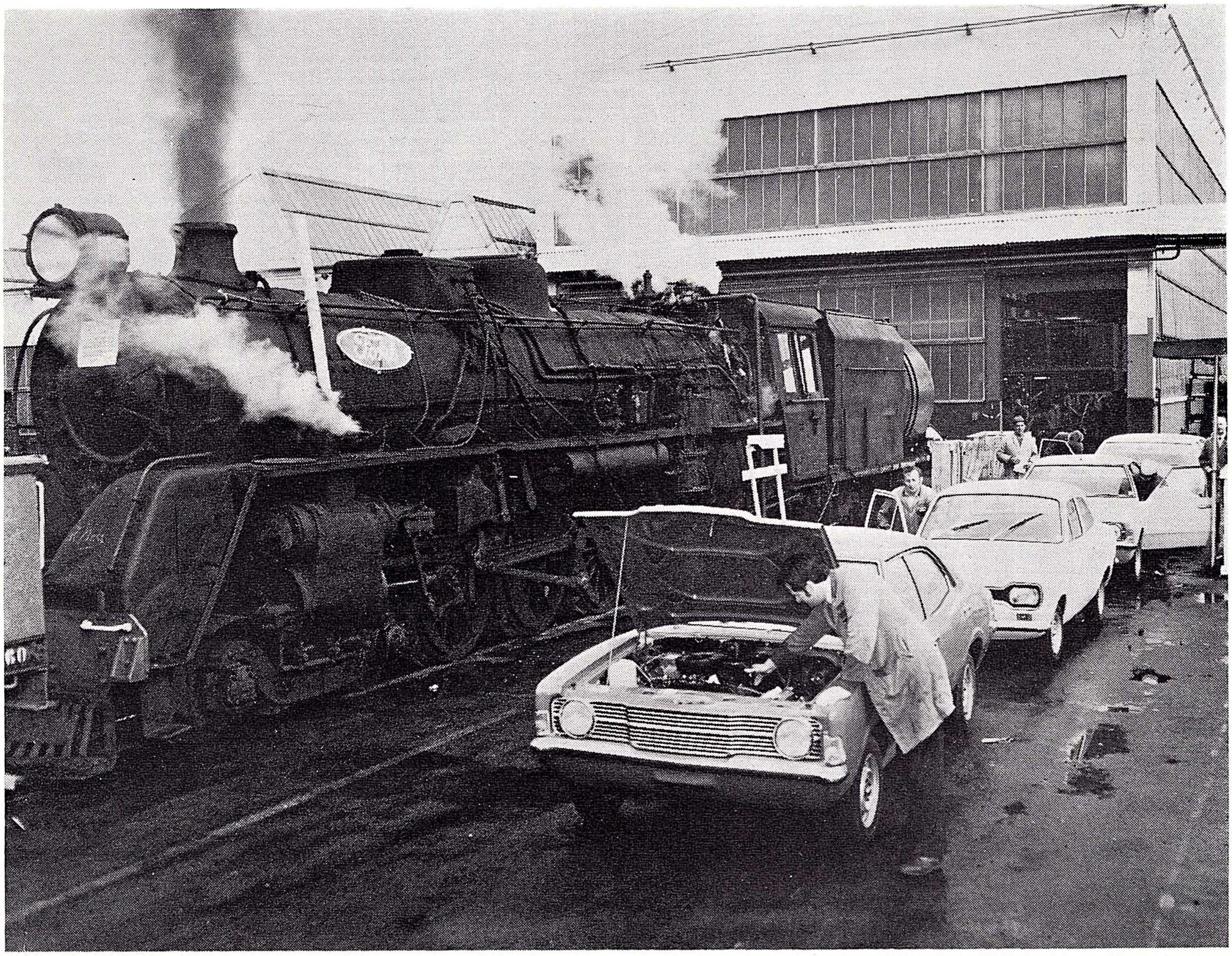
When "Coal" arrived at the factory the "J" looked almost as though it had been part of the Ford plant for years. Ford's trademark had appeared on its boiler. When the 10 o'clock teabreak siren sounded, Mr Smith joined in by blowing the "J's" whistle.

Once, the whistle had warned cars approaching level crossings that king steam in all its majesty was on its way and would take the right of way. Now it was contributing to the operation of a factory where motor cars are assembled.

(Concluded on page 14)



Eric Heath, cartoonist for Wellington's morning daily "The Dominion", depicted the infiltration of coal into Ford's plant.



A "Model J" Ford? — Trademark on boiler, the ex-NZR "J" steams merrily away without going anywhere but helping make cars which will go the length and breadth of New Zealand.

"Eyes . . . (Wait for it, wait for it!) . . . FRONT! . . .

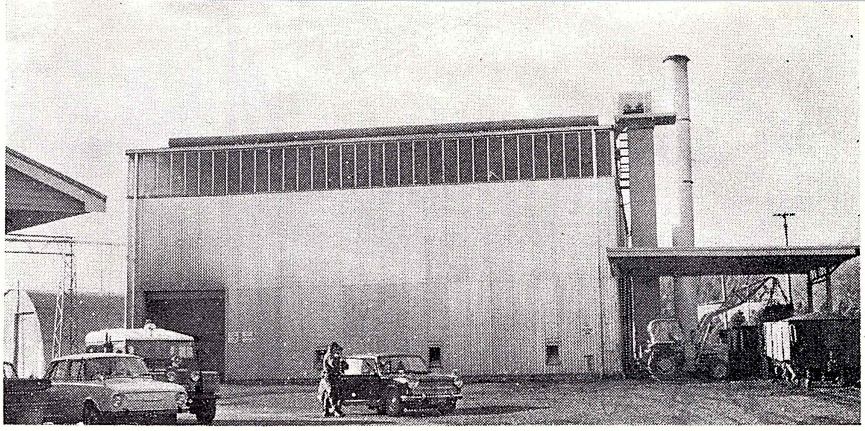
Coal provides warmth at N.Z.'s coldest army camp.

. . . At ease!"

WAIOURU CAMP

Would old soldiers believe — an Army luncheon menu like this?

Soup
Individual meat pies
Saveloys in tomato sauce
Curried beef and rice
Braised lambs' fry and bacon
Chicken chow mein
Creamed potatoes
Green peas
Fresh fruit — Buttered bread — Tea


Boilerhouse at Waiouru Military Camp.

— just an average day's lunch menu at Waiouru Military Camp, typical of the well cooked and presented meals served daily in the 11,900 square foot mess hall.

Much of the heat used for cooking at Waiouru is supplied by coal. Coal also provides warmth in the mess hall, barracks and other buildings to keep at bay the cold the camp was so renowned for, among wartime soldiery.

Designed by the Ministry of Works at Wanganui, and operated by MOW staff, three coal-fired boilers have the job of keeping Waiouru warm.

Coal from the Waikato — 40 tons daily in winter, 15 tons in summer — is unloaded from rail wagons by clamshell at a special siding, alongside the boilerhouse. An elevator lifts the coal into a hopper, and from there a screw feed supplies the boiler hoppers.

The boilers are:

Cochran "Sinuflo" Economic (1954), 6000 lb per hour at 55 h.p.

Cochran "Sinuflo" (1954), 12,000 lb per hour at 115 h.p.

Daniel Adamson Economic (1961), 16,800 lb per hour at 148 h.p.

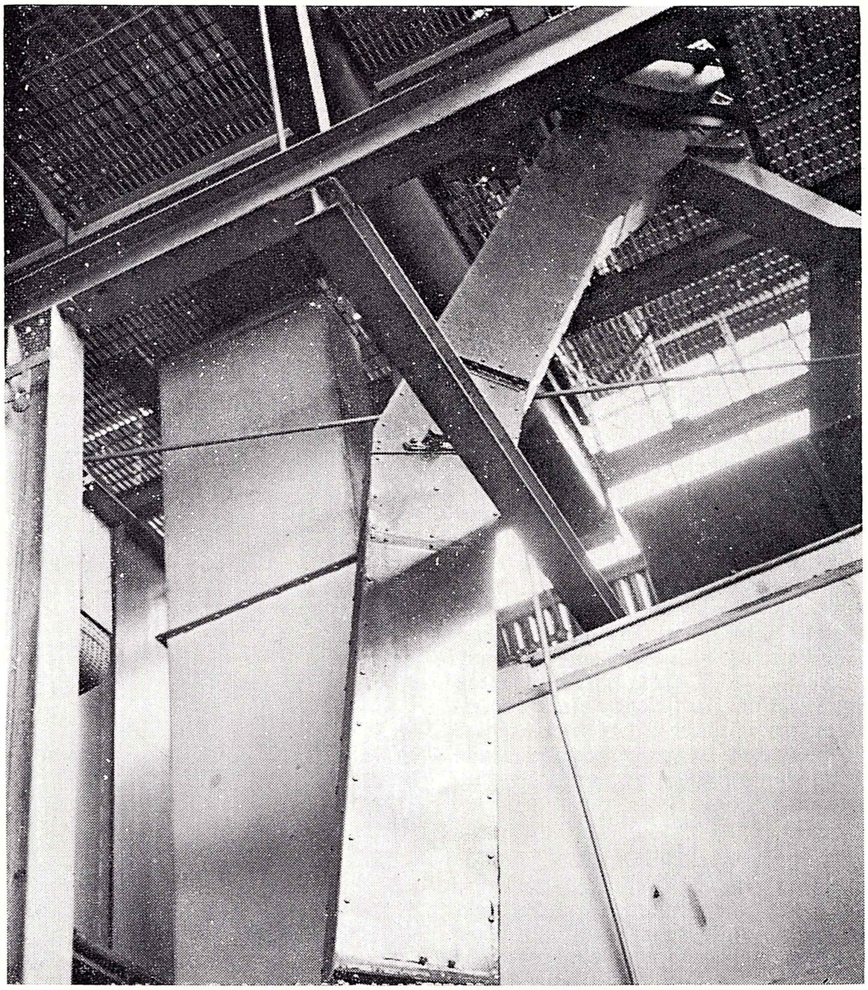
All are fired with chain grate stokers.

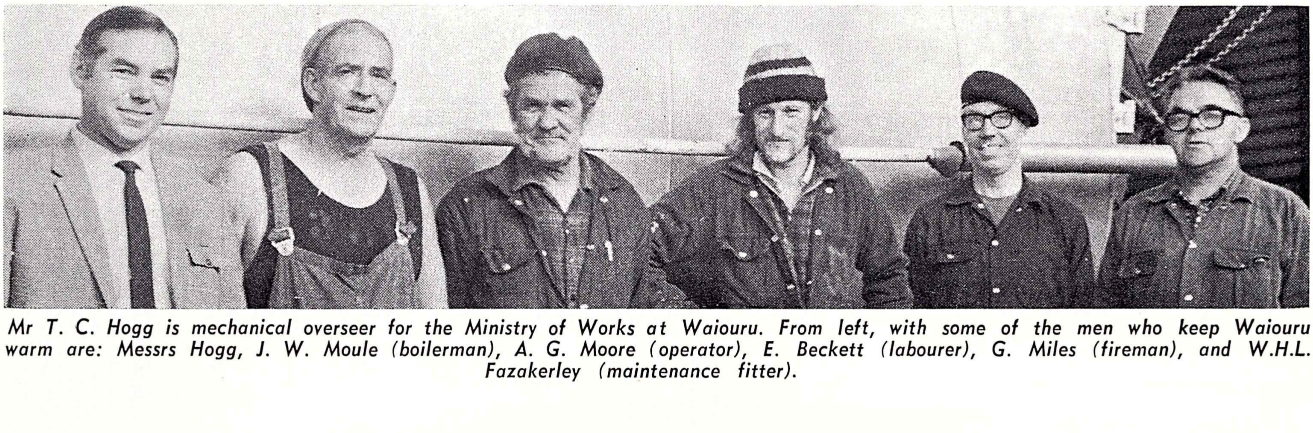
The Cochran Economic has recently been fitted with underfire steam jets which had not been tested at the time of "Coal's" visit to the camp.

Soon to be installed is a Vekos 14,000 lb per hour boiler, to help share the load.

Ash is removed mechanically by bucket elevation to an outside storage hopper.

Seven miles of piping, mostly in underground ducts, carries the steam and hot water services. In winter when snow covers the ground, the underground pipes are easily traced by the lines of melted snow on the


Coal feeds through this ducting.


Mr T. C. Hogg is mechanical overseer for the Ministry of Works at Waiouru. From left, with some of the men who keep Waiouru warm are: Messrs Hogg, J. W. Moule (boilerman), A. G. Moore (operator), E. Beckett (labourer), G. Miles (fireman), and W.H.L. Fazakerley (maintenance fitter).

ground surface above these service pipes.

Climate

Old soldiers who have served at Waiouru will be well familiar with the sort of climate coal is asked to contend with.

Weather office records for three months last year show:

	Max. Temp.	Ground Min. Temp.
July	12.3	−9.7
August	15.3	−7.8
September	14.9	−6.0

Days of snow for 1972: 22. Days of ground frost: 89.

Steam pressure is reduced from 150 lb to 40 for distribution to the camp. While it is economical to operate the boilers at high pressure, 40 lb is adequate to maintain service. As well as heating and cooking, the coal-fired heat services the camp hospital.

In the cookhouses six boilers (four of 40 gallons capacity and two of 15 gallons), one steam oven (for cooking steam puddings spaghetti, etc.) are serviced by steam from the coal.

Two boilers will feed 900 men, with five cooks per shift. After each meal 12 women are kept busy clearing crockery and cutlery and tables.

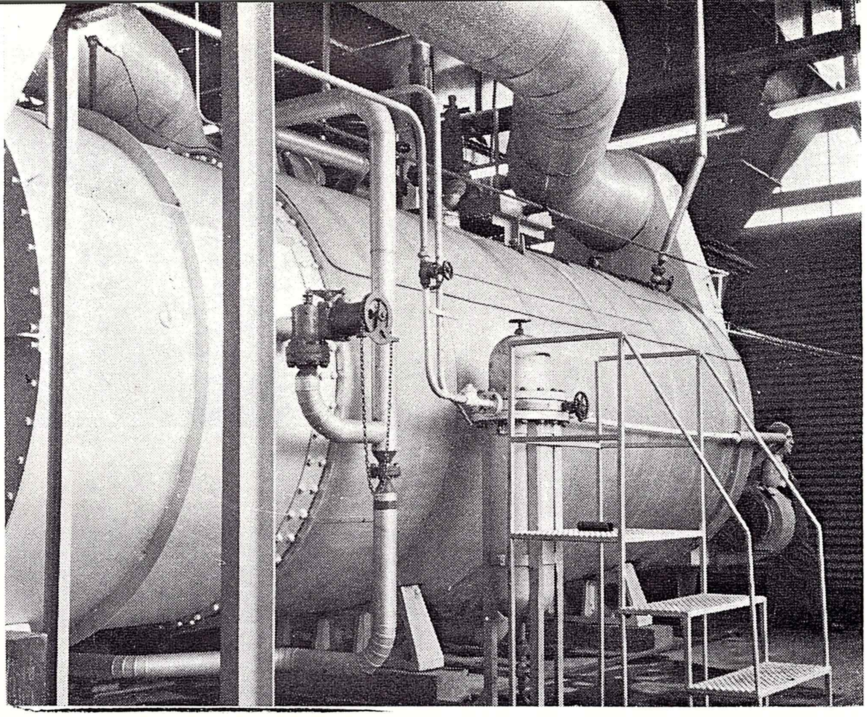
Approximately 1600 soldiers and 100 sailors use the camp facilities. Most are in trades, where their training equates with civilian trades. They work the same number of hours as civilian apprentices and pass civilian examinations. The "star" system, which provides extra pay for trade qualifications, efficiency and experience, provides rewards for efficiency. Promotion to sergeant requires some leadership ability as well as job efficiency.

Chosen

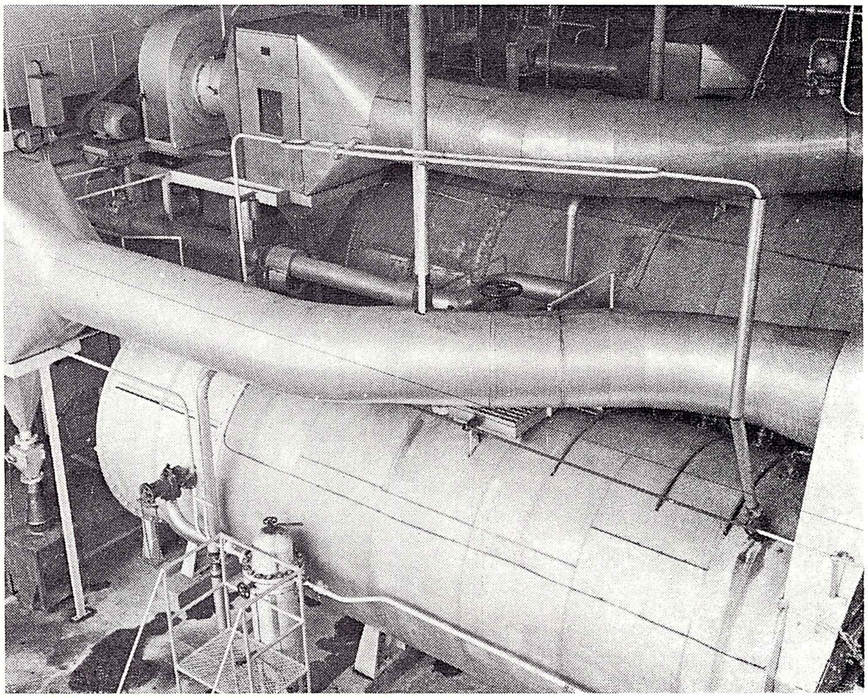
Waiouru was chosen as a site for a training camp because there were large areas for training, and high explosive ammunition could be used without damage to people or property. It is central to any part of the North Island by road, and a rail head existed for moving troops and supplies to main embarkation ports.

The desolate area around Waiouru was first occupied by the army in 1936 when an artillery camp was established. Three years later it was decided to establish a semi-permanent territorial camp, capable of accommodating 2000 men.

Work began in 1940, after World War II broke out the previous year on a three-year plan to produce a camp capable of accommodating 7000 troops. Over 350,000 cubic yards of pumice and dust had to be removed

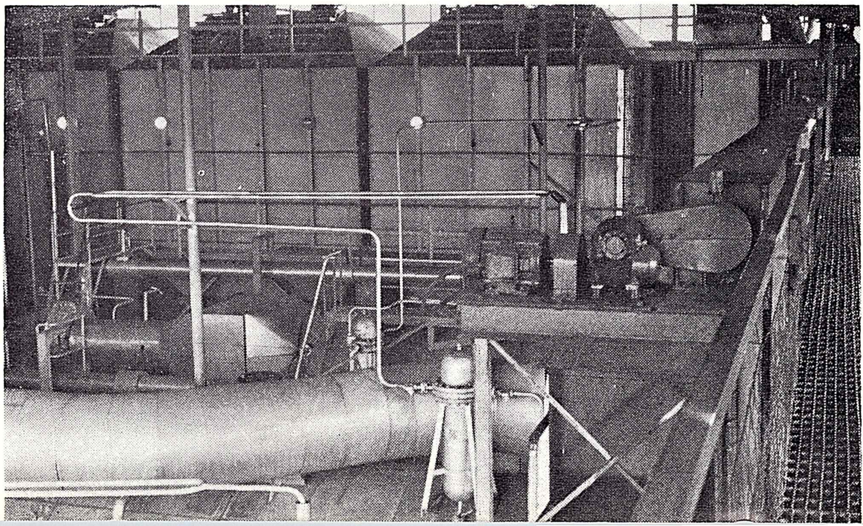


A Vekos 14,000lb per hour boiler is scheduled for installation alongside this Cochran Economic.



Supplying heat for heating, cooking and hospital services at Waiouru Military Camp.

Coal hoppers (in background) in the Waiouru boilerhouse.



WAIOURU CAMP (Contd.)

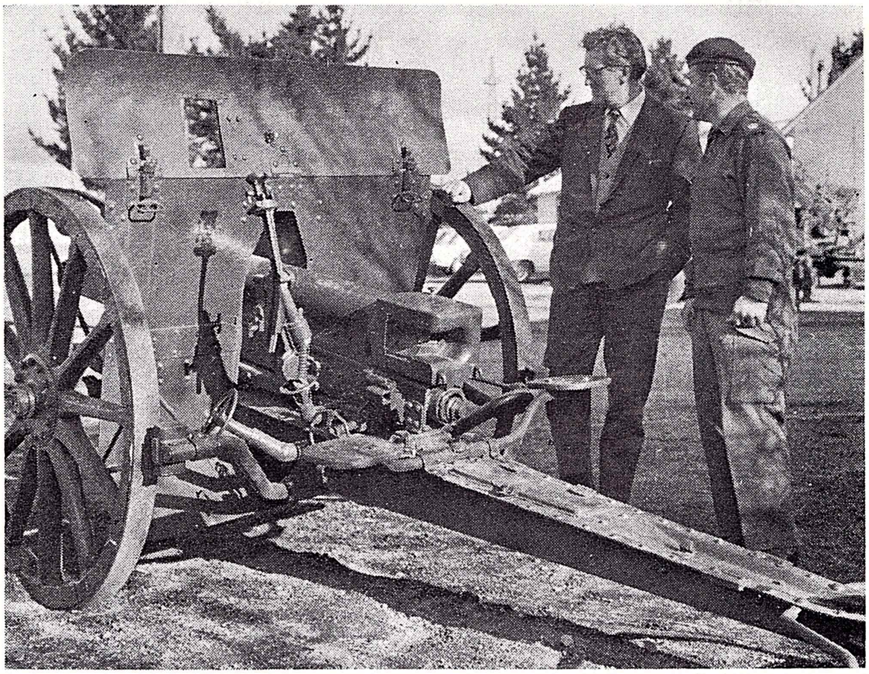
before New Zealand's largest military camp could begin construction.

The first draft of troops moved into Waiouru in January 1941 and during the war years the camp became a busy mobilisation area, the surrounding country proving ideal for training.

In 1948 it was decided to retain Waiouru as part of New Zealand's defence system. Training establishments moved from Trentham, where there was little room for expanding, and by 1952 the Schools of Artillery and Armour, and the Army Schools were operating at Waiouru. Housing then became a necessity and work began on constructing an army town.

Waiouru town is divided into two. The older and smaller area alongside the highway is the township proper and is controlled by the Rangitikei County Council. The army town is controlled by the Government through the army.

This leads to the situation where the commander of Waiouru has the administrative functions for the army town of the mayor of a civilian town. Instead of relying on outside trades men for plumbing, electrical or other services, the residents call on the Ministry of Works to provide such services.



"I'm afraid this is one thing coal won't fire," Coal Research Association Fuel Technologist, Mr K. Paul, says to Major B. Coomber, of this World War I German trophy at Waiouru.

Statistics for this unusual town are:

Eighty per cent of population are army and dependants.

Ten per cent are naval, working at HMNZS Irirangi radio station.

Ten per cent of population are Ministry of Works and local businessmen.

Ninety-five per cent pay rent (approximately 450 Government-owned

One of the messhall sections at Waiouru. Altogether, 900 men can be accommodated in the combined messhall sections.

WAIOURU CAMP (CONCLUSION)

houses).

Five per cent own houses.

In such a town the average age is 26, and people over 50 years of age are rarely seen. Waiouru claims the largest primary school in New Zealand, although for secondary education the older children travel to the high school at the nearest town, Ohakune.

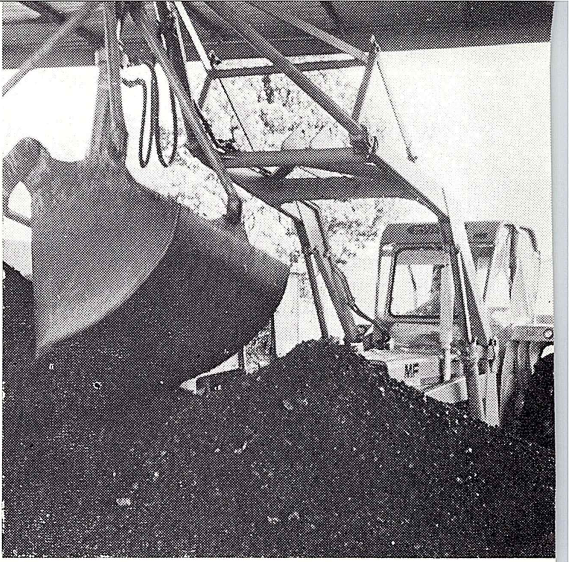
Isolated

Isolated from the amenities of a larger community, the camp is provided with entertainments, and hobbies are encouraged.

There is a showing every evening at the cinema, a library, a hobbies hut with woodworking and metalwork equipment, a wet canteen, good playing fields, two squash courts, cafeteria and canteen service, and a wide variety of clubs for various activities such as the Rod and Gun club.

The most unusual is the Moawhango Surf Club. Taking its name from the nearby Moawhango River, the Surf Club is a social club for the older single sergeants and warrant officers. When publicised in a Wellington daily newspaper, the Moawhango Surf Club aroused the interest of other surf clubs in New Zealand. Reciprocal visit invitations followed, and presentations from clubs — such as harness and rescue line, long enough to reach from the gate to the bar — followed.

Soon to be built is a swimming pool — steam heated by coal-fired steam.



A clamshell unloads 40 tons of Waikato coal daily, in winter.

ALL STEAMED UP

(Concluded from page 9)

Having sounded the "J's" whistle, Mr Smith left the footplate to join the security men, like one of the Ford team, for a cup of tea.

Morning tea over, it was back to the footplate. A couple of shovelfuls of coal, and then he leaned out of the cab window to look at a row of cars parked alongside for inspection. Once he used to look out of a "J's" cab when it was steaming through the country, outpacing cars when the road ran parallel.

Diverted.

Fords speak highly of State Coal, who readily diverted wagons of New Zealand's indigenous solid fossil fuel to the factory in response to the rush request for coal.

Two LC wagons promptly appeared out at Seaview Road, full of Waikato coal, to stand in front of the "J" to provide the means of raising steam.

NZR provided the services of Mr Smith, a fireman whose 32 years' service in railways included firing "Js" on main lines.

"We've had excellent co-operation throughout," Mr Douglas said. "The Preservation Society didn't need to be talked into the idea — they agreed straight away!"

A Titan mobile grab crane has been pressed into service to bunker the "J's" tender, from the adjacent LC wagons of coal.

Future drivers of late June-early July production Falcons, Cortinas, Escorts, Ford trucks and vans and Fordson tractors may not know it — but their vehicle has been produced with the help of a railway steam locomotive, fuelled by coal.

On loan from the NZR, fireman Joe Smith has time for a chat with Mr R. Foss (left), supervisor of plant engineering, and Mr I. G. Douglas, Ford's public relations officer.

A SPACE HEATER NAMED "JIMMY"

"Come on through — Jimmy's in the kitchen," Mrs Norma Kimble said when "Coal" called.

Jimmy is a popular and favourite member of this Upper Hutt household. An Atlas space heater, he has served the house with hot water and kitchen heating so well since the Kimbles moved into their new house in 1952 that he is regarded as one of the family.

Both the coalman and the milkman inquire after Jimmy when they meet members of the Kimble household.

Arriving home in the early hours after a reception, Mr and Mrs Kimble met the milkman on his rounds. "I didn't see any lights on at your place, but Jimmy's going — I can see a bit of smoke," he greeted them with.

When the house was completed in December 1952, Mrs Kimble asked her sister to go ahead and prepare the house in readiness for the moving van's arrival.

"My sister had Jimmy going when we arrived," Mrs Kimble said. "Ours was the only house then, standing by itself in 100 acres, but we could see some smoke and knew that Jimmy was geting ready for our arrival."

No power had been connected, but within 2 hours of Jimmy's being kindled hot water was boiling out of the overflow.

"We used to burn coke, but now that's unobtainable we're using Strongman coal," she said.

There are also economical reasons for Jimmy's popularity.

Six bags of coal cost $10.80. In 1 month this winter, Jimmy and an open grate fire had used three bags in providing kitchen and living room warmth, and in carrying the domestic hot water load — including the hot water needs for a Bendix washing machine.

The electricity bill for two months came to $16.09, over the same winter season.

Coffee was perking, soup was warming and Kim the family cat was displaced from basking in Jimmy's radiated warmth when the space heater was photographed.

Mrs Kimble checks that Jimmy has enough Strongman coal to keep him happy.

Mr T. M. Kimble, a chartered electronics engineer who is now manager of the Wellington Institute of Management, was born and brought up in Invercargill before moving to Wellington to work, and is well familiar with coal-fired domestic heating. The home also relies on an open-grate fireplace for warmth in the sitting room.

"I wouldn't move into a home without a fireplace," Mrs Kimble said.

Certainly, coal has one sure household of friends in Upper Hutt — and one Atlas space heater has been adopted into a family.

WESTPORT PREPARES COAL FESTIVAL

A "Coal Day", to mark Westport's association with coal, will feature in Westport's centennial.

"Coal Day" will be Tuesday, October 16, part of the centennial celebrations that run from Sunday, October 14, to Monday, October 22, inclusive.

The object of "Coal Day" will be to recognise the importance of coal mining to the history and economy of Westport, and to highlight the changes in the industry to meet modern uses of coal.

A national search for New Zealand's oldest coal miner will reward the winner with a sculpture in coal being made specially by Mr Walter Clark, a miner at Westport.

A length of line will be laid in Westport's main street to show electric locomotives from the Buller mines, and a display of modern coal-fired industrial equipment is planned to show how coal use has advanced to its present state of modernity and clean combustion. Rock-drilling equipment will be demonstrated.

Mr B. McP. O'Connor, of Wellington, a research officer and formerly a journalist, has been invited to give an oration about coal. Mr O'Connor has won the Plunket Medal for oratory at Victoria University and the Bledisloe Medal for oratory among New Zealand universities, was three times winner of a national impromptu speaking contest, and led a team that twice won the Parliamentary Shield debates. He has represented New Zealand against Australia in university debating, and has won the national oratory competition and the Wellington L. J. McDonald contest.

As part of the centennial activities, Mr O'Connor will lead a team from Wellington's Rostrum Club to affirm "That Westport is a Swinging Town" on the first day of the centennial programme.

Newspaper editor describes early life in coal

The miner's safety lamp is a constant reminder to Jack Sulzberger of the early, formative years of his life — the coal tie he wears is a more recent acquisition to recall his days in coal.

There are no coal mines in the Wairarapa. Coal used in the district comes by rail from Huntly or by sea from the South Island.

Although there are no coal mines, there is a miner's safety lamp in daily use at Masterton: not for testing gas, but as a polished and treasured ornament. In its own special niche above the fireplace, it does a job by gracing one particular home in the town.

Brass brightly polished, the lamp is a constant reminder to the editor of the "Wairarapa Times-Age" — the district's daily newspaper — of the early, formative years of his life when he began working in the Kaitangata coal mine.

Mr J. J. L. Sulzberger presides over a staff of 20 in the literary department of his newspaper: "We're producing one of the best provincials in the country," he says.

From his hillside home in the Masterton suburb of Lansdowne ("most people think Masterton's flat") he and his family look out over the tree-lined town and the pleasant, rolling plains of the Wairarapa.

"The Wairarapa's an expanding place industrially," Mr Sulzberger told "Coal". He talks about the way the town is progressively-minded: "They're doing things like looking into motel accommodation for solo parents" — and community-minded: "Service organisations here are actively working to make society better. Education is a major industry and the town has one of the most lively arts centres in the country."

Kaitangata

The boy who was born at the coal town of Kaitangata can appreciate community interest and activity in making the world a better place to live in. His father died after being caught in a fall of stone in the Kaitangata Mine. He himself attended primary school in his home town, and had his secondary education at Balclutha, eight miles away. When he left school, in the depression days, the only job open was a trucker in the mine.

"If you didn't do your job there was someone else waiting for it. This made us feel the emptiness of failure," he says. "People of our generation have carried it with us. If we were out of work it instilled in us a feeling of emptiness. Perhaps apparent lack of opportunity was the spur to make the most of what few chances presented themselves. Perhaps we made our own chances."

At least two schoolmates from "Kai" have, like Mr Sulzberger, attained eminence in their professions. Mr Reg Sutton was a foundation member of the National Orchestra, and has played with the New York Symphony Orchestra. Mr J. D. Coulter is a senior meteorologist with the Meteorological Service of the Ministry of Transport.

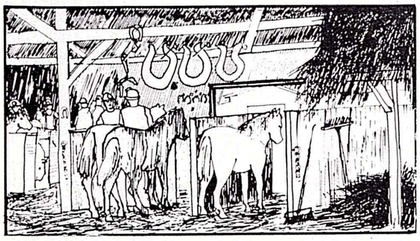
In the thirties, life as a trucker in the mine was hard for young Jack Sulzberger.

"The truckers sometimes had to fight for boxes. The miners would complain if you couldn't keep up a supply of boxes to them to keep pace with their output.

"If you weren't tough, there was no sympathy for losers."

If there was no sympathy for losers, there were rewards sometimes for good work. Miners could earn up to £1 a day in the right conditions, and: "The miners would throw you a bit extra on payday if you were a good trucker."

Horses provided the main motive power for hauling the boxes then. The mine horses were fat, and well groomed by Fred Vickers, and they had minds of their own. "On frosty mornings we would go into the stables, redolent with smells of oats and chaff and oiled leather, and squeeze beween two ponies and warm ourselves before the call to start work."



There was entertainment also, in those days before the transistor radio.

Singing

"Waiting for a box, you could hear Ivor Hale, a Welshman, singing on the other side of the brattice," Mr Sulzberger recalls. The Welsh, of course, are as famous for their singing as they are for their coal and rugby.

Kaitangata homes of the period had none of the amenities of today's New Zealand households. Most homes did not even have a water supply laid on, and no taps. The polished coal stove was a focal point.

Mr Sulzberger had prepared for "Coal's" visit with some notes he had written down. Describing Kaitangata in those times, he writes:

"Here were none of the coal-grimed weather-beaten cottages with their symbols of impermanence associated with the fictional characteristics of mining villages. There was nothing temporary about Kaitangata. Its streets were clean and the small steep-gabled cottages were freshly painted behind their picket fences and their trim gardens. There was a pride to the place. A fierce pride of ownership. There was a pride indeed; a pride of survival over great difficulties. I noted this when I returned a few years ago when there were rumours that the mine would close. The people moved closer together. They stood fast to what was theirs."

Education

Although busy as a trucker, young Jack Sulzberger was intent on continuing his education.

"I was striving under tremendous difficulty to get an education," he said. "People used to help me.

"By and large, the older people of my generation in 'Kai' recognised the value of education and pushed people towards it. It was something many of them had been denied."

Study continued whenever there was a chance: "I used to swot during crib time. I'd push a skip on its side and get under it to read."

Youngsters get their education much more easily today than their fathers did.

Mr Sulzberger's son is completing his Master of Arts degree, after a year's scholarship in Moscow. His elder daughter is at Teachers' Training College, and his second daughter works for an accountancy firm in Masterton.

If today's generation thinks it is concerned about people and problems, young Jack Sulzberger belonged to a generation that had its share of problems. Despite the opinions of today's youth, the older generation also thought and worked towards a better society.

"I got out of the mine by reading a book," Mr Sulzberger said. "I had a thing about wanting to tell the world what it was all about. There is more to life than having to toil in a mine, slaving your guts out.

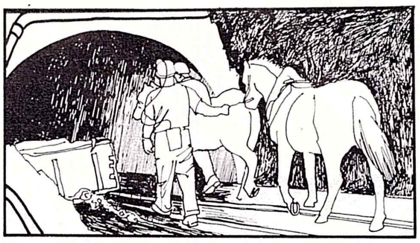
"As I remember it, we had to walk four miles underground to work. I used to watch this and then think that men shouldn't have to do this for a living.

Packed

"One day I packed my crib bag and walked out. I had a deep-rooted sense of injustice then. I thought I had to tell the world and I could do it through a newspaper.

"The 'Clutha Leader' at Balclutha gave me my chance. I used that experience to learn how I could reach a wider world."

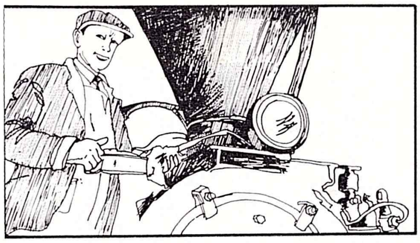
Mr Sulzberger moved on to the "Otago Daily Times" at Dunedin, but his journalistic career was interrupted by World War II. He served with the engineers, attached to the South Africans and the Indian Division during the North African campaign. He served in Italy, and on returning to New Zealand became chief reporter for the "Grey River Argus" in Greymouth.



He was editor of the Dannevirke "Evening News" for six years, and then became assistant to the editor and leader writer on the Hawke's Bay "Herald-Tribune" at Hastings. Three years ago he was appointed editor of the "Times-Age".

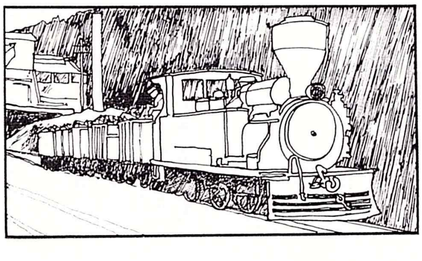
"Working in a coal mine taught me that you have to take chances," he says. "Risks have to be calculated."

Coal and "Kai" are far from forgotten, however, and the safety lamp above the fireplace is a constant reminder. Mr Sulzberger is looking forward to a visit to Greymouth to meet old friends of the "Argus" days — and a reunion with a very old and special friend from Kaitangata days, now working on the Coast.



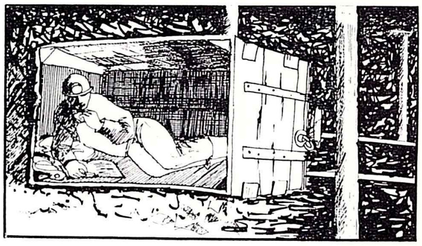
This is the working steam engine at Shantytown, near Greymouth. The engine worked at Kaitangata all its life, until the Mines Department presented it to Shantytown in 1971.

"We used to travel behind it in a red caboose every day to high school at Balclutha," Mr Sulzberger says. "Ikey Blackburn and Bill Jarvie used to drive it then. The guard was Bob Leshman and he maintained an iron rule over us all."



Burr

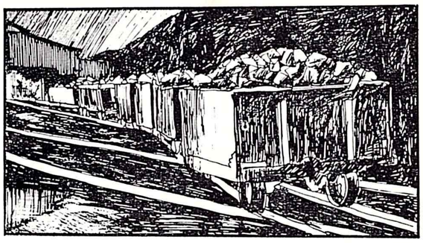
Sometimes the trace of Southland burr reminds the listener that Jack Sulzberger is from the South, and it is obvious that he has never lost his attachment for his home town.



"Where else in New Zealand is there such a diversity of language garnered from so many parts of the United Kingdom? Where else does the word 'crib' mean a weekend cottage, a card game, to cheat, to steal, a baby's cot, and lunch? Where else is a dullard called a 'stookie'? Where else through a long life can a man carry the appelation 'weechiel' (wee child)? And as a child, how many New Zealanders have been comforted with the softly spoken words 'dinna greet, ma bairnie, dinna greet'?"

Wet

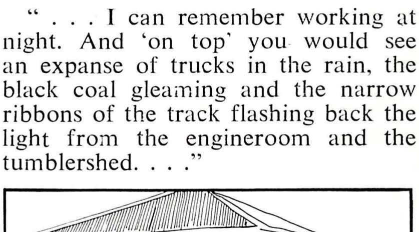
Kaitangata Mine was owned and operated by the Kaitangata Coal Company when young Jack Sulzberger worked there.

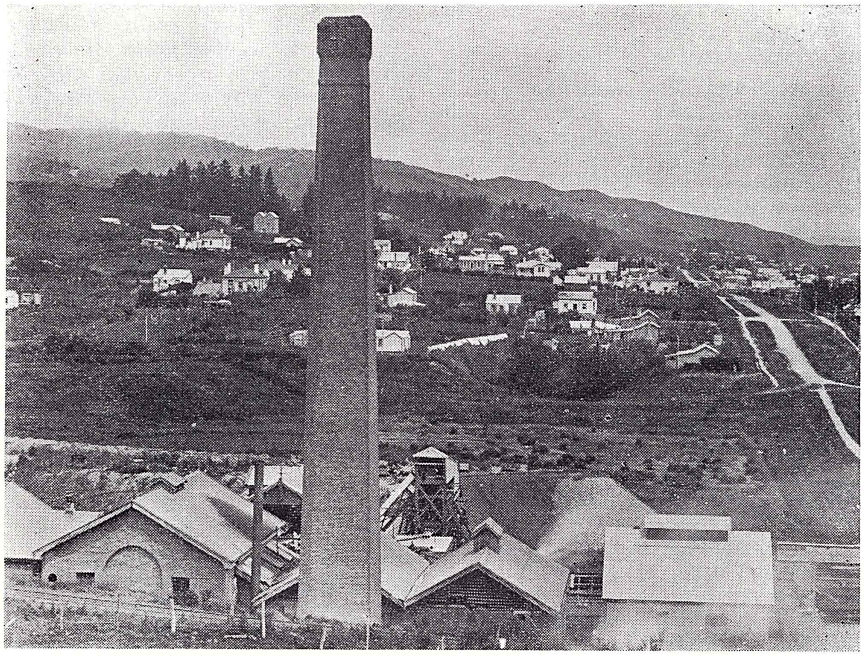


"There were wet places and dry places. The seam was 4ft 6in to 15ft — in places the miners were working on ladders.

"You went through Mundy's Dip. There was a winch at the top. Then you got to the levels. . . .

" . . . I can remember working at night. And 'on top' you would see an expanse of trucks in the rain, the black coal gleaming and the narrow ribbons of the track flashing back the light from the engineroom and the tumblershed. . . ."





The old Castle Hill Mine at Kaitangata, with part of the town beyond. (Alexander Turnbull Library photograph.)

"When I heard that the Kaitangata mine was to close it came as a blow. Time and distance tend to soften it, but there's an agony in learning that a death sentence has been passed on the place where one was born. The politics and the economics that were the indictment on which the town's fate hung become irrelevant. Emotive currents take over. No matter what happens the town will never die."

Contradiction

Miners are a contradiction, Mr Sulzberger thinks. Conservative towards their work, they are as far left as one can go in their politics. Perhaps the pressures of those times, so unlike present conditions, were the cause of such political radicalism?

"Kaitangata has been through stress before. In the lean 30s the mine

Chief reporter David Scoullar (left) and chief sub-editor Fazal Rahman (right) attend Mr Sulzberger's daily editorial conference at the "Wairarapa Times-Age".

closed. The men gathered in little despondent groups outside the post office and outside the miners' hall. But they didn't despair. They didn't take easily to public works camps or to day labouring when or where they could find it. Theirs was a special skill and they had to divert it to new channels. The surprising thing was that when the mine reopened not all of them came back. Their skills had been adapted to other uses."

Mr Sulzberger is one who never went back.

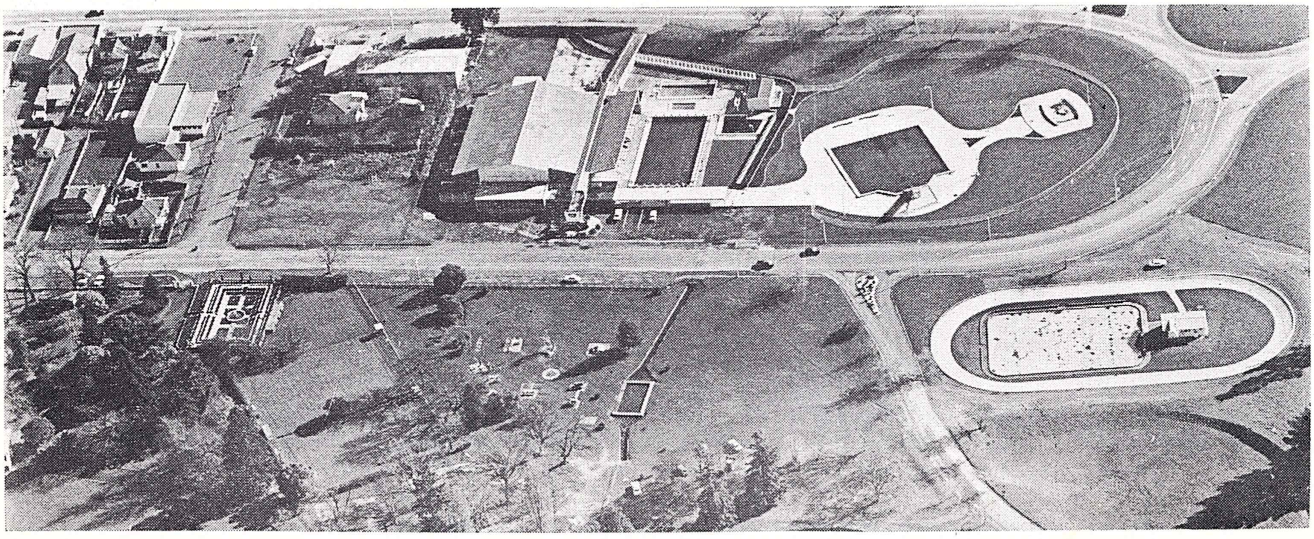
But whether driving his rev-counter fitted Toyota, browsing through his large bookcase or controlling the editorial standards of a daily newspaper, he has always the safety lamp in its niche at home to remind him of his days in coal.

It is there to evoke memories of the mine that closed in 1970, of workmates, of good times and of bad, of the camaraderie of the past.

The lamp is a constant reminder of the life of the miner: "When the coal talks and the pillars move. When bluegum props split down the middle . . . "

Sounds and movement from the past, once heard, seen, and experienced — never forgotten.

Masterton's sports complex at the northern entrance to the town. A banked skating track is in the right foreground and behind it the lido pool and giant slide — built as a Lions' Club project—connected with the War Memorial Stadium and swimming pool. The sunken garden, a feature of Queen Elizabeth Park, is in the left foreground.



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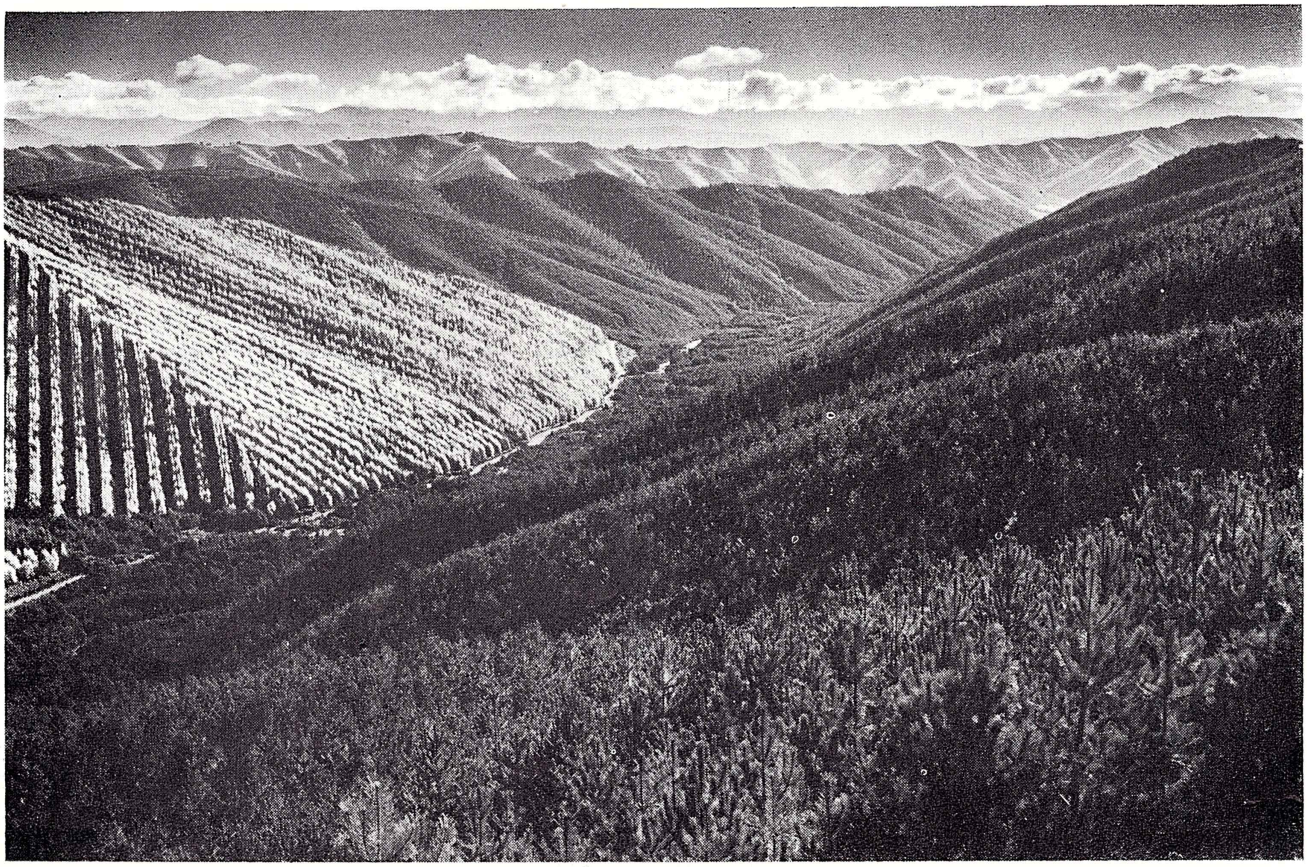


Corsican pine, radiata pine, Japanese or European larch and Douglas fir growing in Golden Downs State Forest.
(N.Z. Forest Service photo)

CHIPS & BRANCHES

"Lots of chips, and plenty of branches if you want to go up in the world," the old joke says about prospects in the N.Z. Forest Service.

For the boys training as woodsmen in the Forest Service's training centre at Golden Downs Forest, Nelson, the life is a vigorous outdoor one. Hard work in the forest each day, summer or winter, and a return to a well-controlled hostel for nourishing meals and the healthy recreation and sleep to follow such work.

The return to the hostel each day is a switch from the wood of the forests to the warmth of coal: heating, including room and hot water services, and some of the cooking services, are supplied by coal.

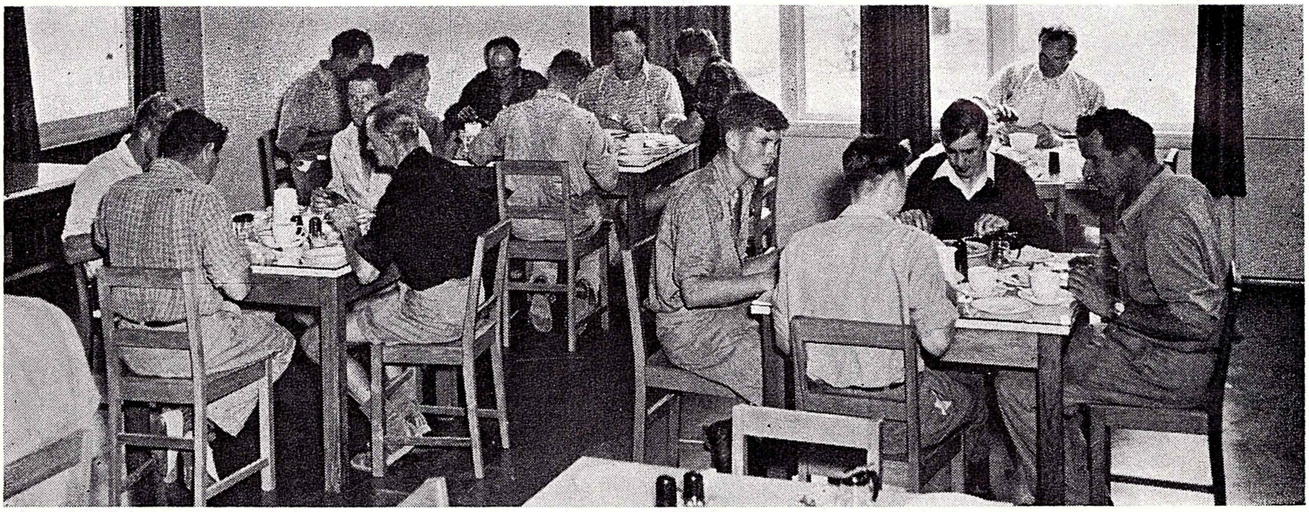
Coal fires two Ideal Britannia cast iron boilers. They have a rated output of 1030 lb per hour at a temperature of 212° F. The maximum operating pressure is 10 p.s.i. They are fired with two Vale No. 25 underfeed stokers.

Over 300 boys applied to train as junior woodsmen with the Forest Service last year. Not only country boys apply, as many city youths look to forestry as an outdoor life away from the confinement of the cities.

The Forest Service operates a junior woodsman school at Kaingaroa State Forest, near Rotorua in the North Island, and in the South Island a smaller one at Berwick State Forest operates in addition to Golden Downs.

Boys must be fit, between 16 and 18, and ready for the more isolated life of forestry workers. Approximately 90 are accepted each year.

The course begins in January each year, and boys are employed as junior labourers for the first six months. This gives the boys and the Forest Service the chance to ensure that foresty is the career they are best suited to. After this trial period, suc-



Outdoor work and exercise creates a healthy appetite. Some of the cooking services are supplied by coal.

cessful candidates become junior woodsmen, being taken on to the permanent staff of the public service.

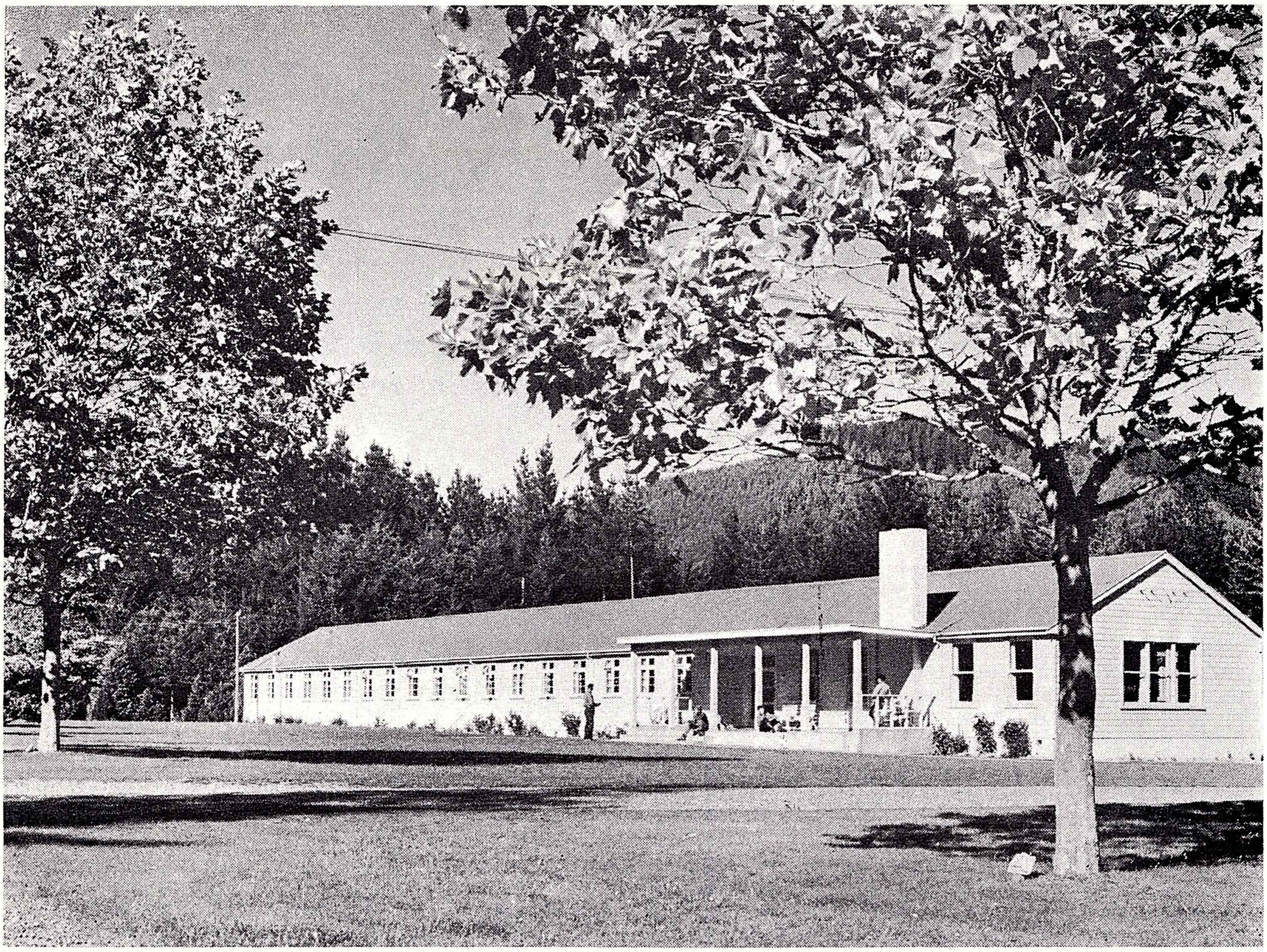
For their third year, the boys are sent from the Woodsmen Schools in groups of six to specially selected forests to continue training under competent instructors.

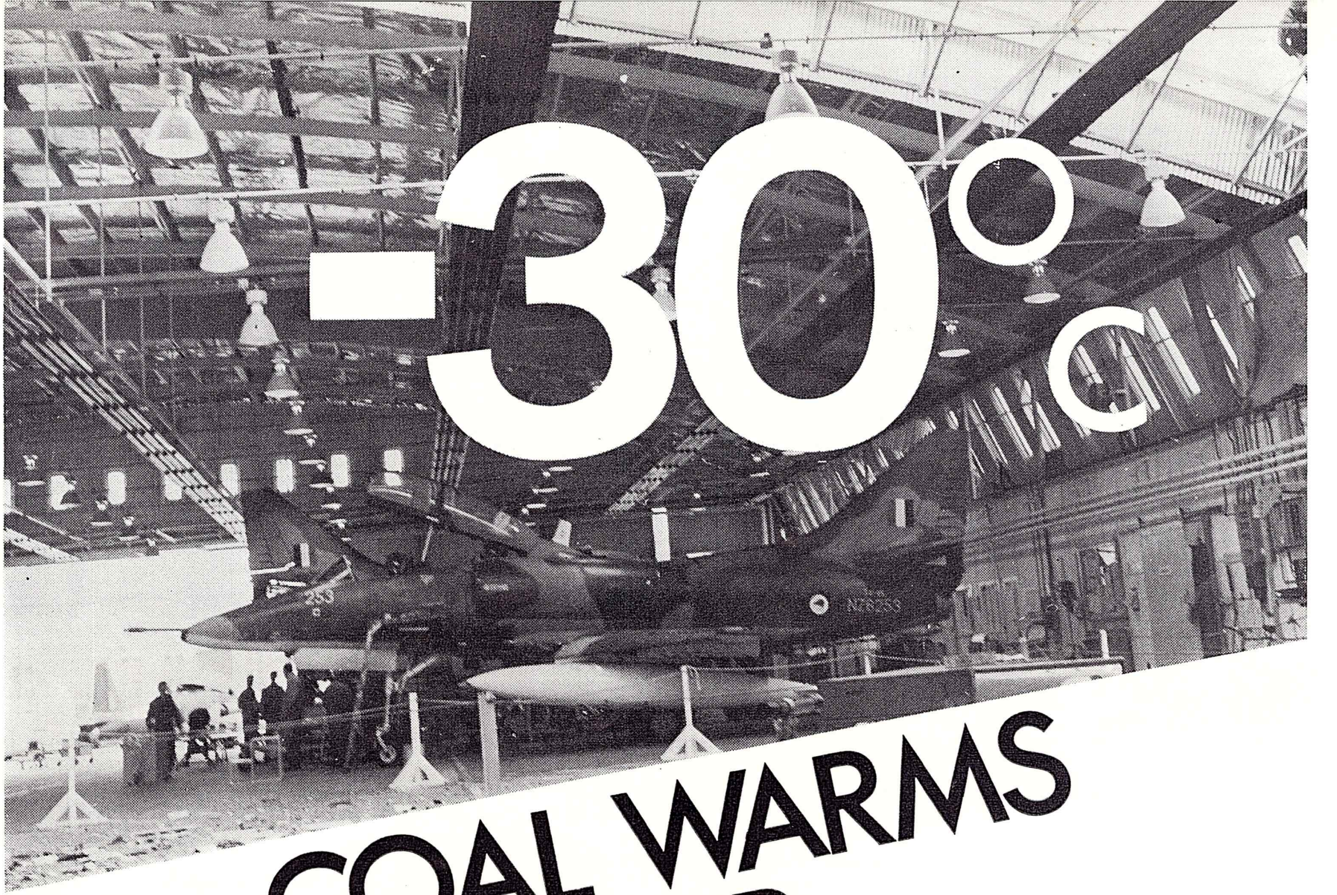
The final year is designed to teach the boys self-reliance and qualify them for a Woodsman Certificate. They are then posted to any of the 461 forests controlled by the Forest Service.

Woodsmen who show aptitude for certain work are encouraged to specialise and can be given extra training in those special skills.

(Concluded on page 24)

Hostel for junior woodsmen at Golden Downs State Forest headquarters.
(N.Z. Forest Service photo)





COAL WARMS N.Z'S AIR STRIKE FORCE

A Skyhawk nests in its coal-warmed hangar. Note heat-reflecting insulation in hangar roof.

Thirty-five thousand feet up in the air, with outside temperatures in the order of minus 30 degrees Celsius makes for very cold working conditions.

All the more reason, therefore, for the 14 Skyhawks and the 10 Strikemasters of the Royal New Zealand Air Force to enjoy a return to their home at Ohakea air base and into their hangars, cosily warmed with coal heat, after a day's flying in such cold.

While New Zealand's operational strike aircraft are not fuelled by coal, they — and the men who maintain them — do rely on New Zealand's premier solid fuel for warmth.

The Ministry of Works at Wanganui designed and supervised the installation of the coal-fired heating system at Ohakea. A Vekos Powermaster boiler, installed last year and commissioned in November, supplies 6.2 million Btus per hour of hot water. This is piped as far as 700 feet away, to workshops and hangars, where wall panel heaters radiate the warmth. Before coal, fires or electricity had been used to keep the work places warm.

The bunker has a capacity of 16 tons of coal, consumption running at about four tons of Smith's peas a week. The coal in the bunker is raised by screw feed and then passed pneumatically to the stoker.

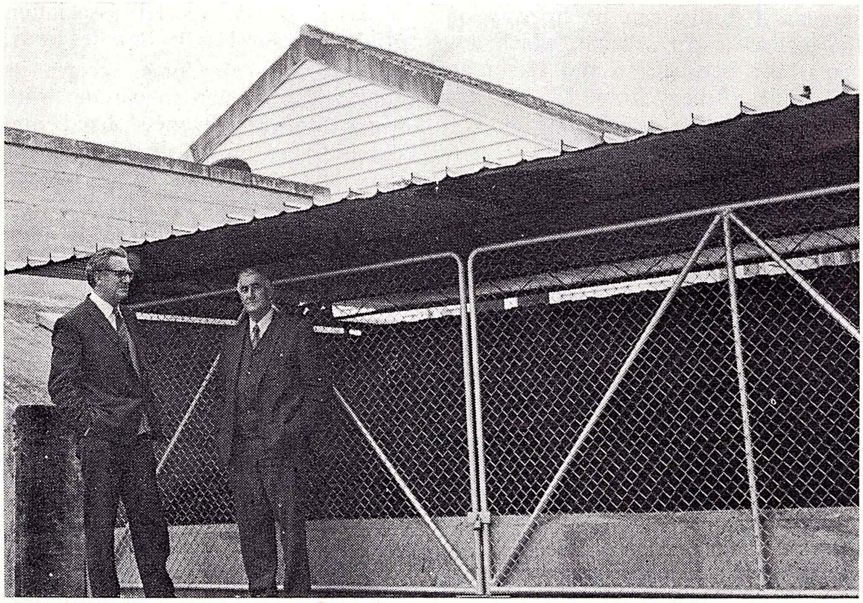
The hot water feed to the radiators in the buildings goes underground and through buildings.

A4 Skyhawks

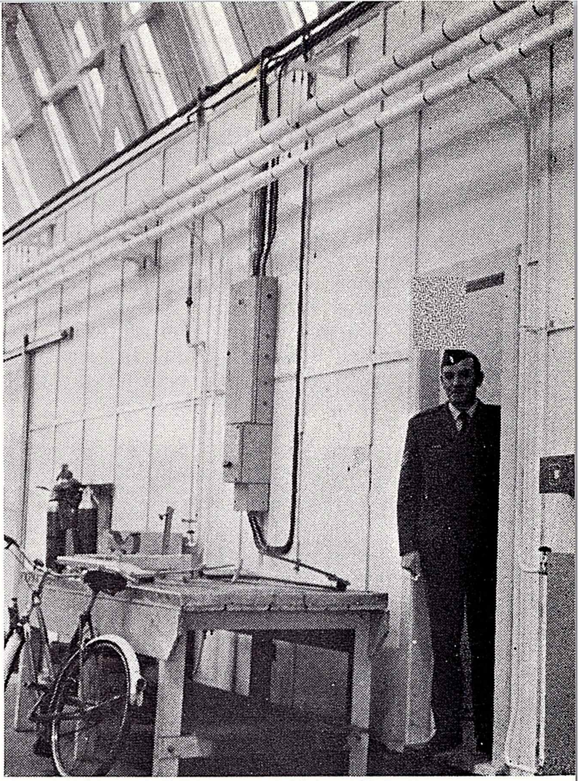
The A4 Skyhawks at Ohakea are operated by No. 75 Squadron, which shares the base with Nos 14 and 42 Squadrons. No. 14 is an operational strike training squadron also equipped with Skyhawks as well as Strikemaster and Harvard aircraft. No. 41 operates the VIP flight as well as internal passenger flights. Parachute training is carried out by a detachment of Dakotas at Whenuapai.

Building began at Ohakea in 1938, when the RNZAF was re-equipping with some of the more modern aircraft which saw service in World War II, and when the wood and fabric biplanes of the period were being relegated to training duties. A rail service connecting to the main line was one of the reasons for the choice of site.

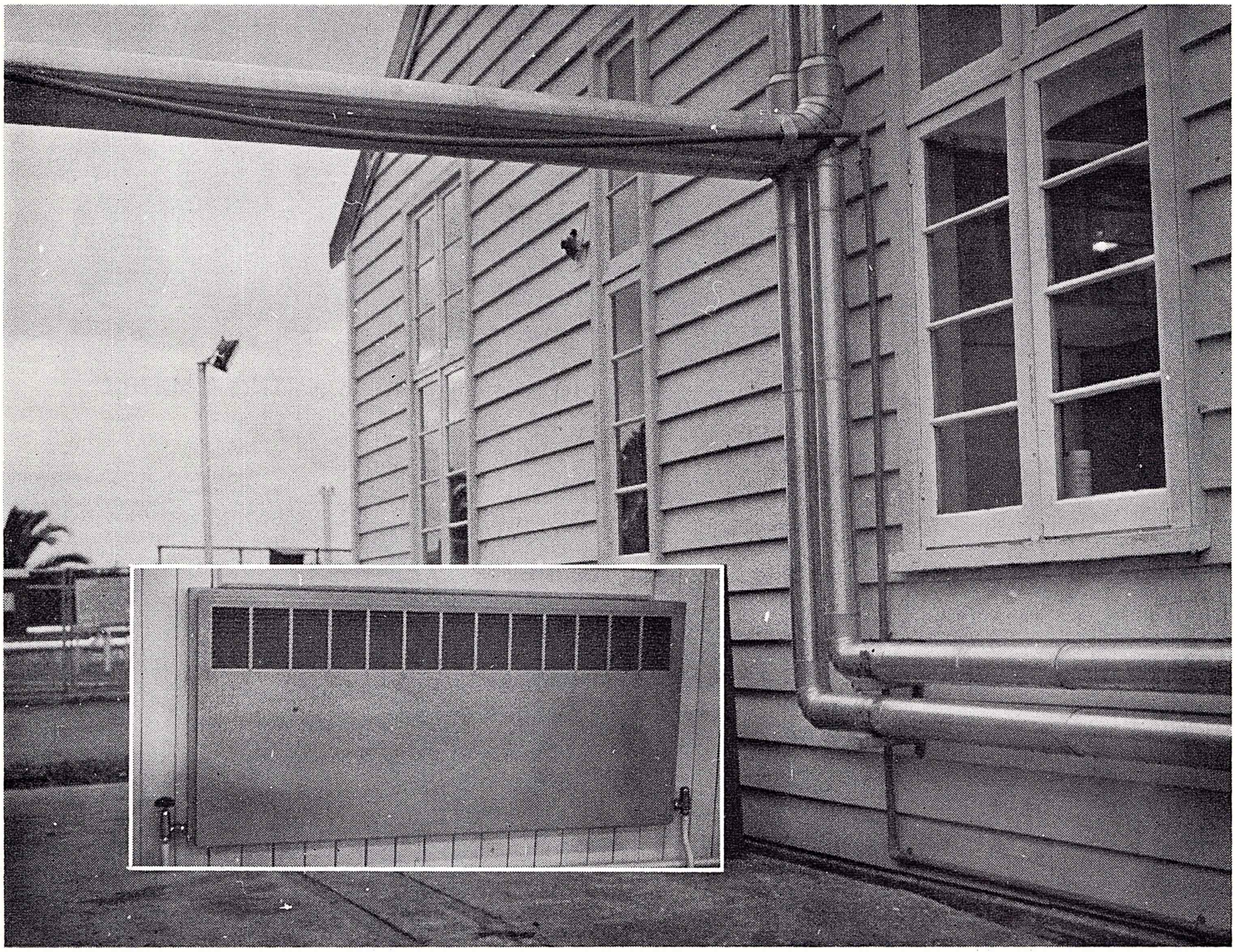
Wartime expansion of the RNZAF saw Ohakea greatly expanded, and with the passage of time and the erection of permanent buildings, careful



Mr J. Imrie (right), Works Supervisor for the Ministry of Works at Ohakea talks to Mr K. Paul of the Coal Research Association outside the coal bunker at Ohakea. Mr Imrie has been 25 years at Ohakea, and supervises a staff of 66. The Ministry of Works is responsible for 250 houses at Bulls, for RNZAF and Works staff, and is also responsible for the landscaping at the air base. Plants for the landscaping are provided from their own nursery.



Hot water reticulation to buildings (below) and along tops of hangar walls (above) feeds off to wall-mounted radiators (inset) at floor level.



layout and landscaping have given the base avenues of trees and a permanent appearance.

Today there are about 550 staff employed at the base, including 40 women. Single accommodation is provided on the base, and married housing is provided both at Ohakea and at the nearby town of Bulls.

The training given in specialist fields is acknowledged to be of a high standard. Entry can be by way of the airman cadet scheme, which accepts boys between 16 and 18, or as an adult airman from 17½ to 35. Entry for flying training is at 17½ years.

The RNZAF maintains a unit at Singapore, giving the opportunity of an overseas posting at some stage in their air force service.

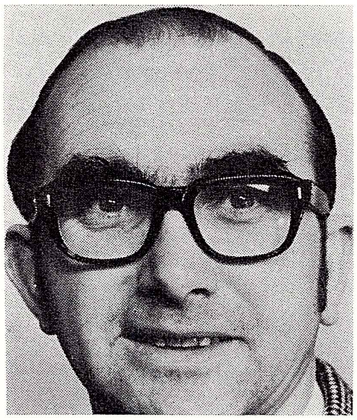
Ohakea has a special association with Palmerston North, 18 miles away. Annually, the air force accepts its traditional invitation to parade "with swords drawn, bayonets fixed and colours flying", while the city's mayor takes the salute. This annual parade is usually held on a date close to Battle of Britain Sunday, in mid-September.

Coal-heated hot water extends to the hangar.

Fuel Technologist Appointed

Mr R. B. Campbell, a former marine engineer who has spent some years in hospital engineering, has been appointed to Auckland as fuel technologist for the Coal Research Association.

Mr Campbell was born and bred in Stirling, Scotland. Apprenticed at Clydebank with John Brown and Company, he went to sea as a marine engineer with the Ben Line in 1958. Two years later he came to New Zealand, and has been on the engineering staff of the Wanganui Hospital Board for the past nine years.



Mr R. B. Campbell, M.N.Z.H.E.A.

THINK METRIC

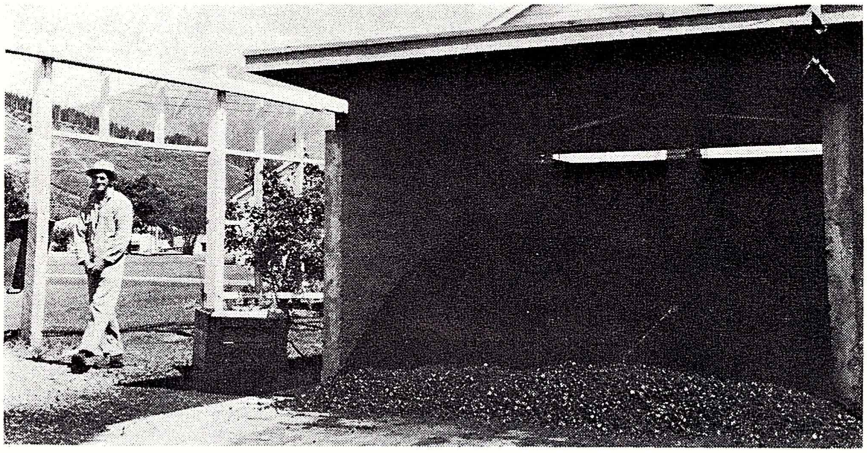
CHIPS & BRANCHES

(Concluded from page 21)

State forest totals 2¾ million acres in the Nelson conservancy, which covers Nelson and Marlborough Provinces, and extends into the West Coast beyond the coal-mining town of Reefton. The headquarters of the conservancy is the Golden Downs Forest, which covers 75,000 acres.

The Golden Downs area was originally native beech forest, but this was burnt down by early European settlers to clear the ground for farming. They had only limited success in establishing pasture, but the Moutere gravel soils were well suited to growing exotic forests and planting began in 1927.

The main species now planted are radiata pine and Douglas fir, but Corsican and Ponderosa pines and some others are included.



Mr Sedley Win, boilerman at Golden Downs and some of the coal used for heating and cooking services.

Like Father Like Daughter

New Zealand's first woman coal merchant

Like father, like daughter. When Mr Fred Cox, coal merchant at New Plymouth, died last year, his daughter took over the business.

Mrs Beryl Bamford took over on November 15 of last year, so becoming New Zealand's only woman to operate her own coal merchant's business.

Previously, she had gained some experience by managing her father's business when her parents were on holidays overseas on several occasions during the last 15 years.

She feels she gets on well with the dairy factory managers and the retail merchants who are her clients. "I felt I knew them when I went around," she says. "I had spoken to some of them on the phone before, and I've heard my father talking about them."

Mrs Bamford is not a supporter of women's libber Dr Greer. "I took this on because it is an interest and something to do," she says.

With one son — John — aged 19 and living and working away from home as a farm cadet, Mrs Bamford has only her second son — 15-year-old Mark — and her husband to look after. Mark is sitting his school certificate this year.

66 Trucks

Supplying coal to dairy factories (11 of them) and practically all the retail merchants in Taranaki involves ordering and distributing about 66 trucks of coal a month, plus seven trucks of carbonettes ("can't get enough of them"). It also involves travelling around Taranaki once a month — sometimes more frequently — to call on customers. Mrs Bamford finds time to fit in a couple of games of golf each week (handicap: 16) and some games of table tennis in the basement with her son.

"Coal" asked Mrs Bamford how she regards the men in the coal industry she has business dealings with.

"The chaps in the coal industry are all right — so long as they don't catch me too early in the morning!"

Mrs Bamford has not yet been down a coal mine, but is considering a visit to Huntly to meet the miners and managers and see how coal is produced.

Naturally, she burns coal to keep her own home warm: "It's brighter, cheerier, and does not dry the air," she says.

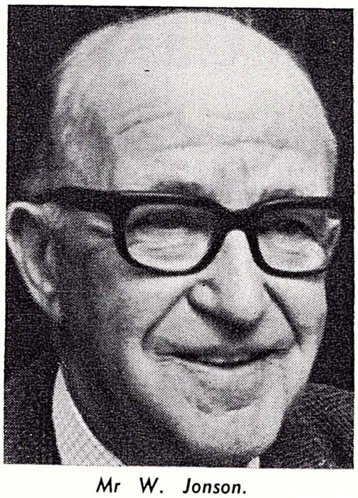
Mrs Beryl Bamford.

Mr F. H. Cox, Mrs Bamford's father, came to New Plymouth after the first world war, from Stratford in England. He had served in the Dardanelles campaign during that war. He died suddenly last year, after a week's illness in hospital.

* * *

THE PATH TO RETIREMENT IS A MILLION MILES LONG

Walter "Wally" Jonson, who retired as Sales Manager of David Lloyd Ltd at the end of last month (July), reckons that since he learned to drive at the age of 15 he has logged almost a million miles in the course of his work.



Mr W. Jonson.

In his 16 years with David Lloyd Ltd, coal and cement distributors, Mr Jonson built up a tremendous mileage as the company's representative promoting coal in the whole of the North Island and cement in the Auckland province. Mr Jonson must have a liking for round figures — especially the magic million — for in the sixteen years he was with David Lloyd Ltd he chalked up sales approaching three million tons of coal.

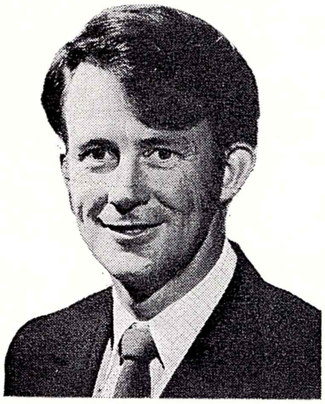
Before Mr Jonson joined David Lloyd Ltd he worked for the New Zealand Co-operative Dairy Company for 26 years, the first seven as a factory worker making condensed milk, three as a representative at Hamilton and 16 as a representative stationed at Pukekohe. As a representative he was chiefly concerned with servicing the needs of suppliers and factories.

In soliciting business for David Lloyd Ltd he says he has relied on "the personal touch". He liked to maintain close liaison with the production staff involved in the mining operation as he felt co-operation between sales and production resulted in the highest degree of customer satisfaction.

Mr C. M. Richwhite, Governing Director of David Lloyd Ltd, says of Mr Jonson: "Wally will be remembered for his honesty, integrity and tenacity and he will be greatly missed."

And what will Mr Jonson do in retirement?

"I have made an unbelievable number of friends and contacts over the years and I'll be kept busy maintaining contact with many of them."

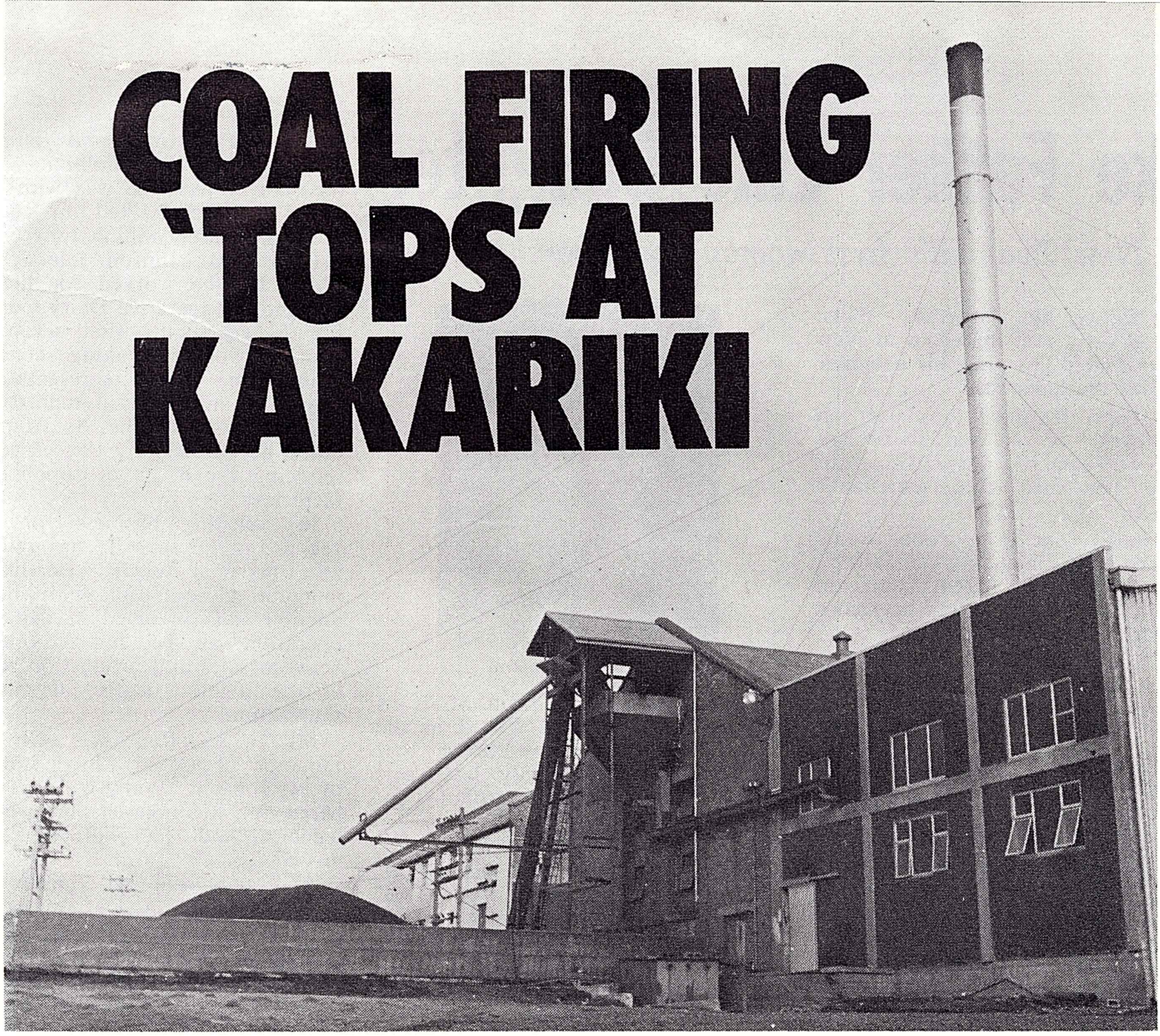


Mr J. M. Jeromson.

Mr J. M. Jeromson, C. Eng., M.I.Mar.E., M.N.Z.I.E. has been appointed marketing manager at David Lloyd Ltd. He will be responsible for all sales of coal throughout the North Island.

Mr Jeromson was apprenticed with Cable and Co. in Wellington and sailed for five years as a marine engineer in tankers, qualifying as a chief engineer. He worked for the Wairarapa, Thames and Auckland Hospital Boards before entering the coal industry as a fuel technologist for the Coal Research Association in May, 1971.

COAL FIRING 'TOPS' AT KAKARIKI



A new Mason three pass economic boiler was installed at Felt and Textiles, Kakariki, in 1971. Supplying 16,000 lbs of steam per hour, it took over the load formerly handled by an under multi with a capacity of 9,750 lbs per hour and a Mason Economic 10, capacity 10,800 lbs per hour.

Carding, Combing and Dyeing wool for Carpets

With coal an essential ingredient through providing heat, wool for carpets is being prepared at Felt and Textiles Wool Co., Kakariki (near Marton).

The process involves carding, where all the wool fibres are parallelled; combing, where the long, spinnable fibres are separated from the short fibres; and perhaps dyeing, where the wool is re-carded.

"All the wool scoured is mainly fine merino," we were told. Some comes from the South Island, but most is usually imported. Five percent of the production is fine wool and the rest is for carpets.

On a 100-acre farm next to the factory a flock of Drysdale sheep are being developed by Felt and Textiles. This breed of sheep was imported to eventually replace the Scottish Blackface, which at present provides 10 per cent of all carpet wool.

Top-making (the preparation of carpet wool) began at Kakariki in 1968, and about 25 tons of pea grade coal are used weekly in supplying carpet factories at Auckland, Wellington and Christchurch with the Kakariki product.

As well as supplying carpets for New Zealand, these factories export to Australia.

In the top-making process the wool is scoured and blown into bins by a draught of air. These bins feed into the hoppers of the carding machines.

As the carding machines straighten and tease the fibres, vegetable matter such as seeds are removed by burr rollers.

In this process the wool passes 24 rollers which work in different directions to clean out the vegetable matter.

As "carded sliver" the wool is washed to clean out any surplus dirt and then prepared with the fibres straightened to get them along the axis of the sliver.

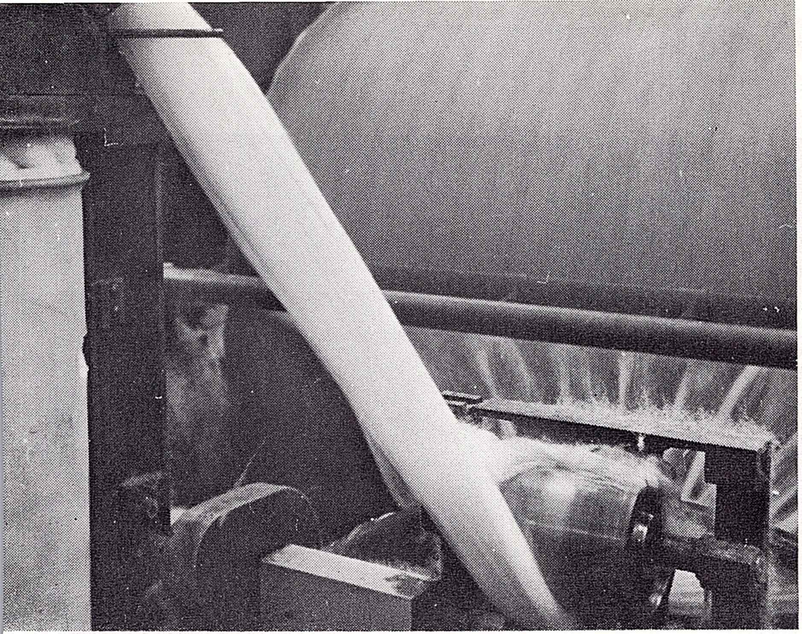
The combing process feeds the wool through a Mackie "Auto-Leveller" and then a Mackie "Finisher Gill".

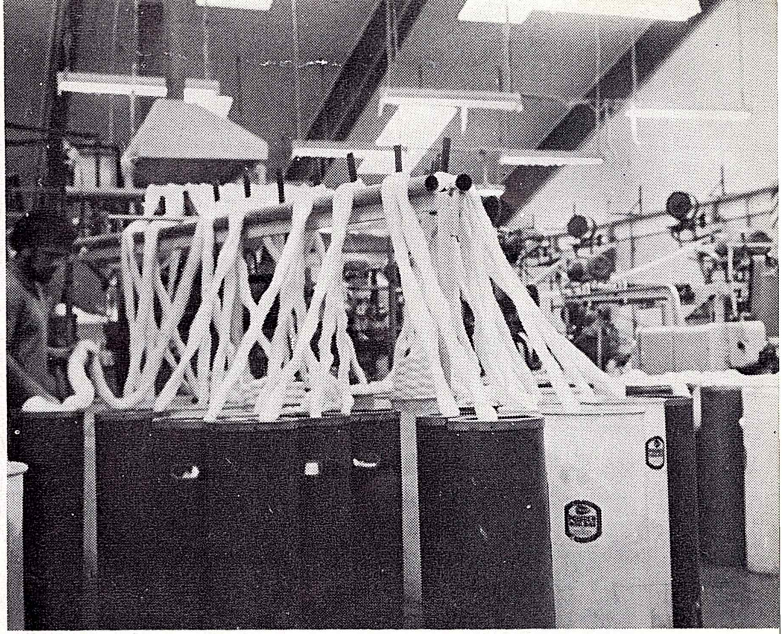
Now it goes to the dye-house for dyeing in the "top". From the "wet-top storer" it goes through a "back wash" to remove surplus dyes.

Prepared, punched and re-combed: it is processed through auto-levellers and the finisher gill.

Now it can finally be made into "tops" and dispatched to the carpet factories for weaving into carpets.

"The world can't do without wool, nor can we do without synthetics," "Coal" was told at Kakariki. "If the demand for synthetics is increasing, the total demand is growing and wool demand is increasing similarly."





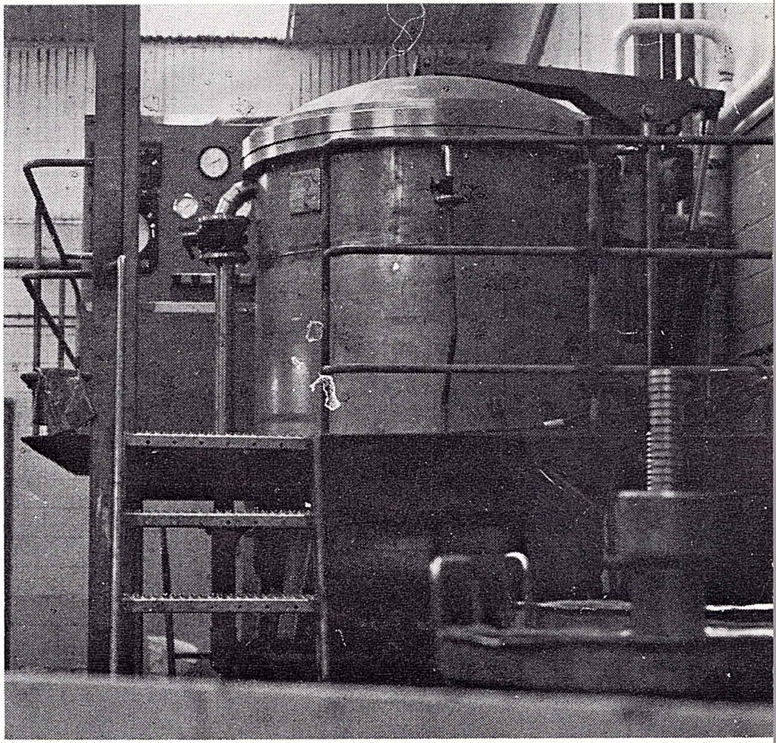
(Top left) The worsted carding machine.

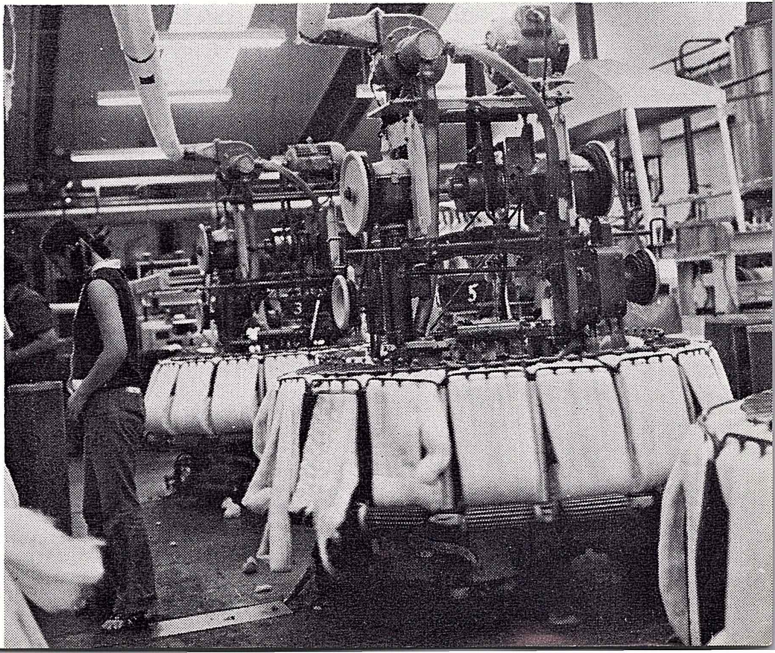
(Top right) Slivers feeding into backwashing.

(Centre right) The high temperature and pressure dyeing machine.

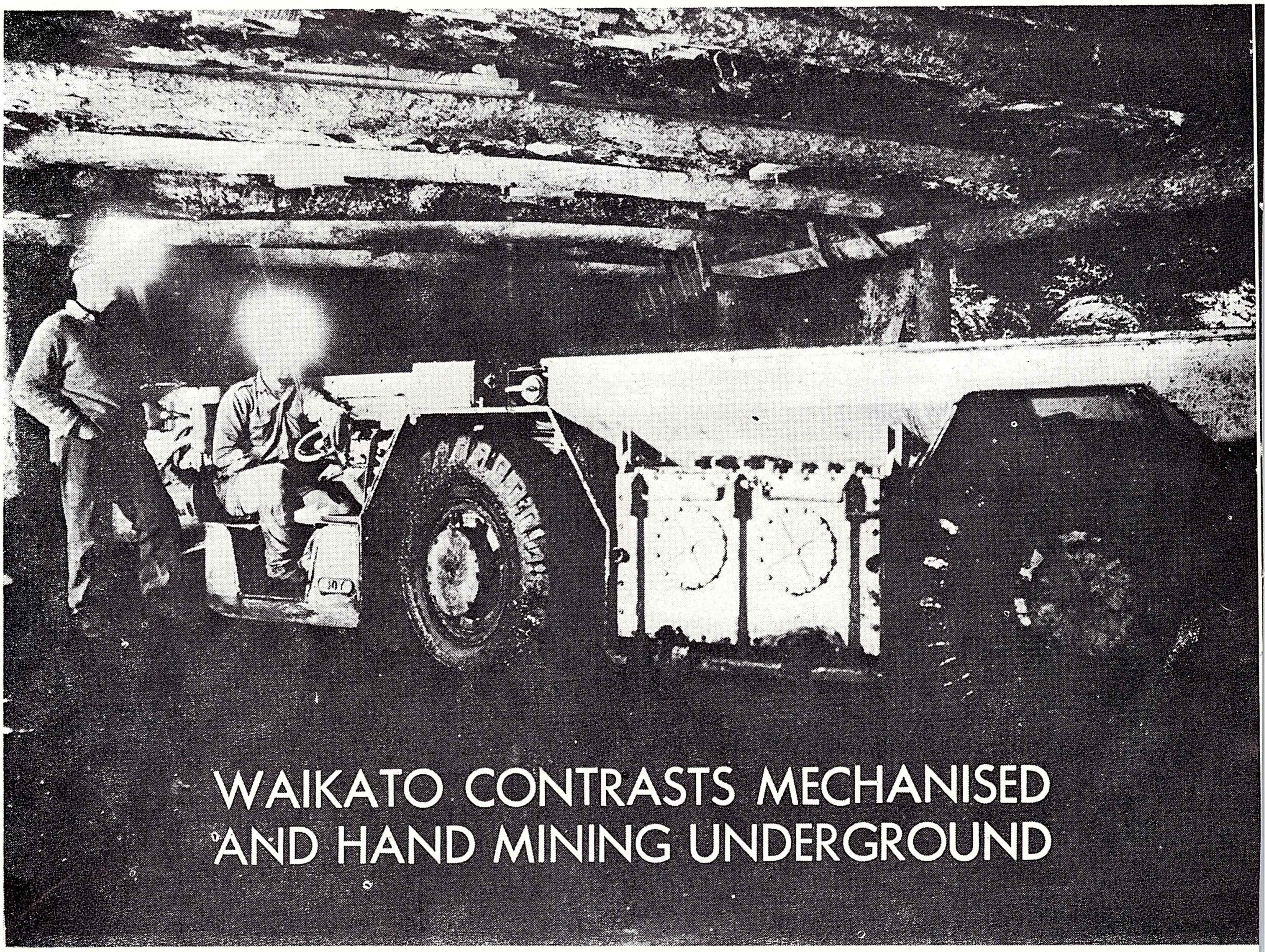
(Bottom left) The automatic feeders for carding machine.

(Bottom right) Noble combing machine.





WAIKATO CONTRASTS MECHANISED AND HAND MINING UNDERGROUND



One of the two shuttle cars working underground, taking coal from the continuous miner to the conveyor belt.

"Coal mining will never be the same again," wrote the chief reporter of the "Waikato Times". He was describing the mechanised mining developments at Huntly, adjacent to Hamilton where the "Times" is printed.

"Coal, tons of it, untouched by human hands or the sweat of men.

"Where the action is, there might be three or four men . . . . . But they are either sitting down or standing around — pushing buttons or observing.

"Life is not too tough down here."

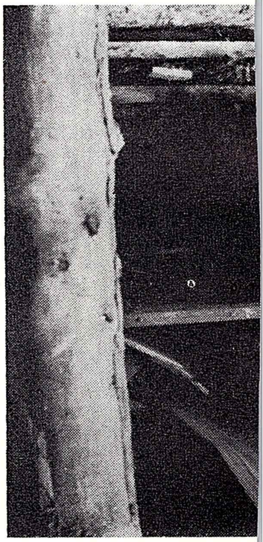
The "Times" team of chief reporter Bill Robson and photographer Leon Karp visited both Rotowaro No. 5, the new mechanised mine, and the older, adjacent, Rotowaro Mine. Apart from a coal cutter, coal is extracted at Rotowaro by hand mining.

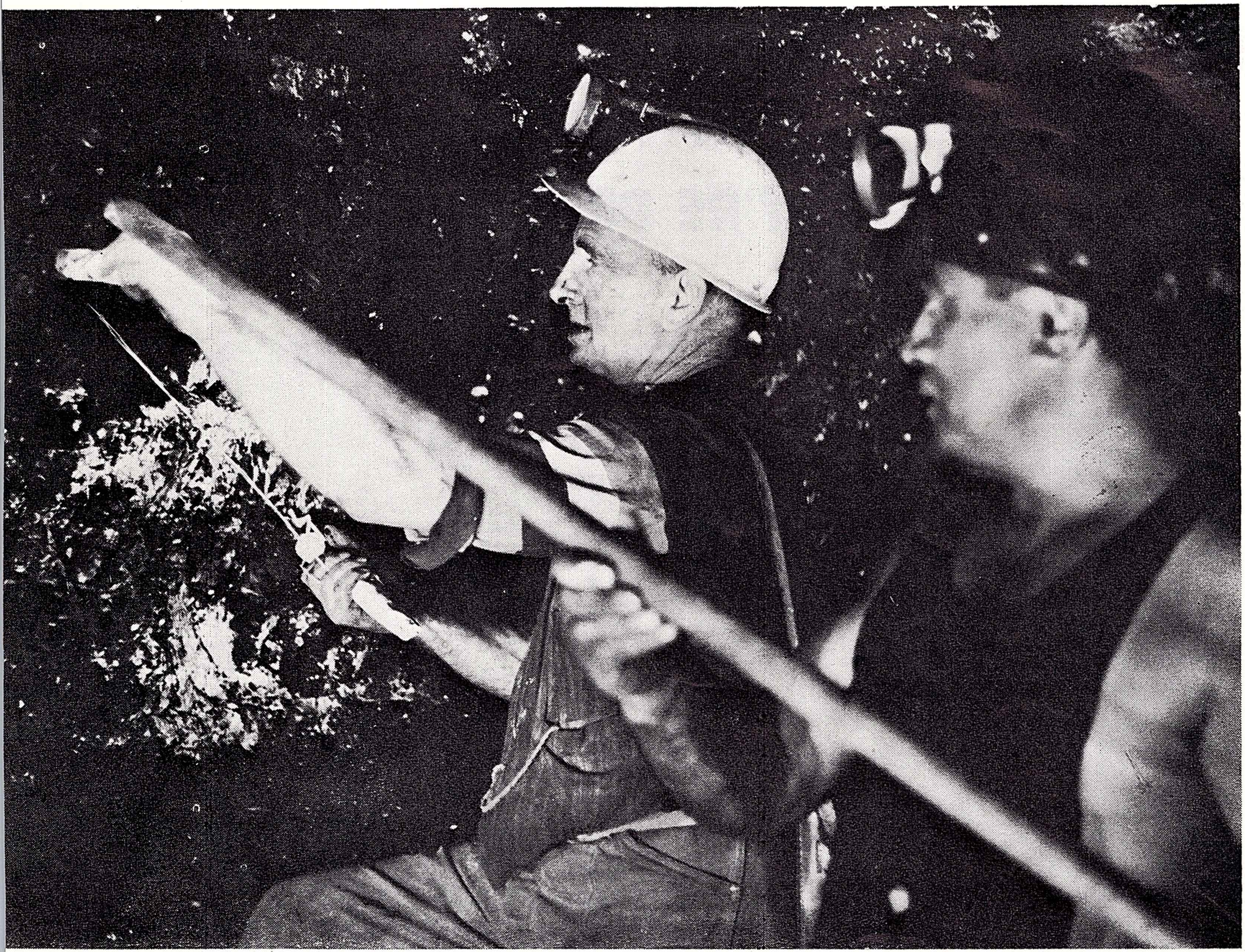
Mr F. W. Munden, manager of Rotowaro No. 5, told the visitors: "It became necessary to find a faster, more economic mining method.

"Costs and wages may change but the capacity for hard work doesn't. "When a man averages 10 or 11 tons a shift — with only half an hour for lunch — he's really working hard.

"If you can't increase the capacity of the man, you've got to increase the capacity of the operation. And that can only be done by mechanisation."

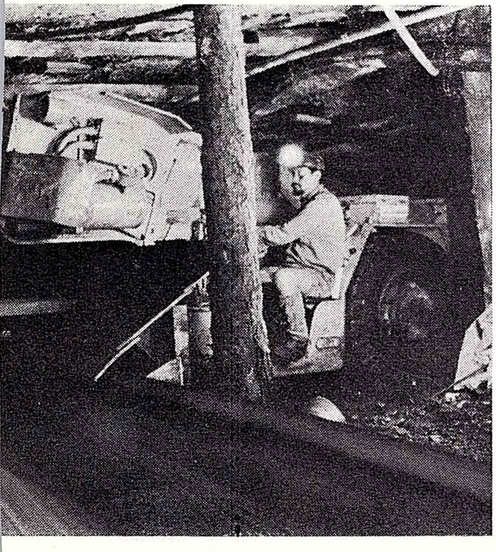
A shuttle car prepared to
after d



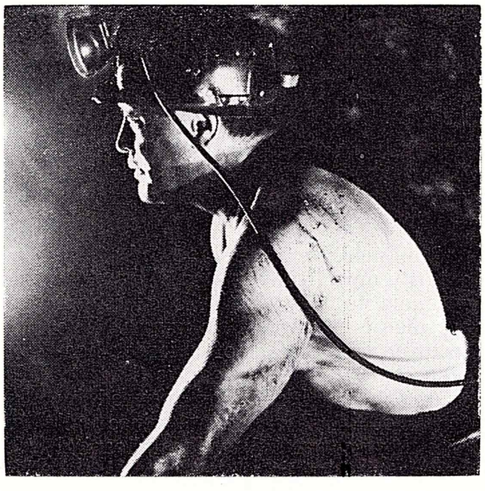


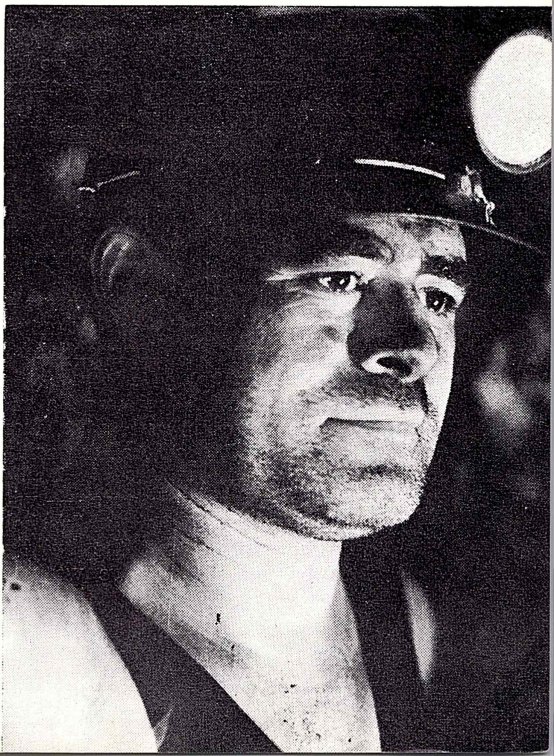
In Rotowaro Mine, where hand mining is still the rule, explosives are inserted in drilled holes, under the supervision of a mining official, to shatter the coal face and free the coal for shovelling into a box.

urn to the continuous miner for another 8-ton load,
harging coal on to the conveyor.



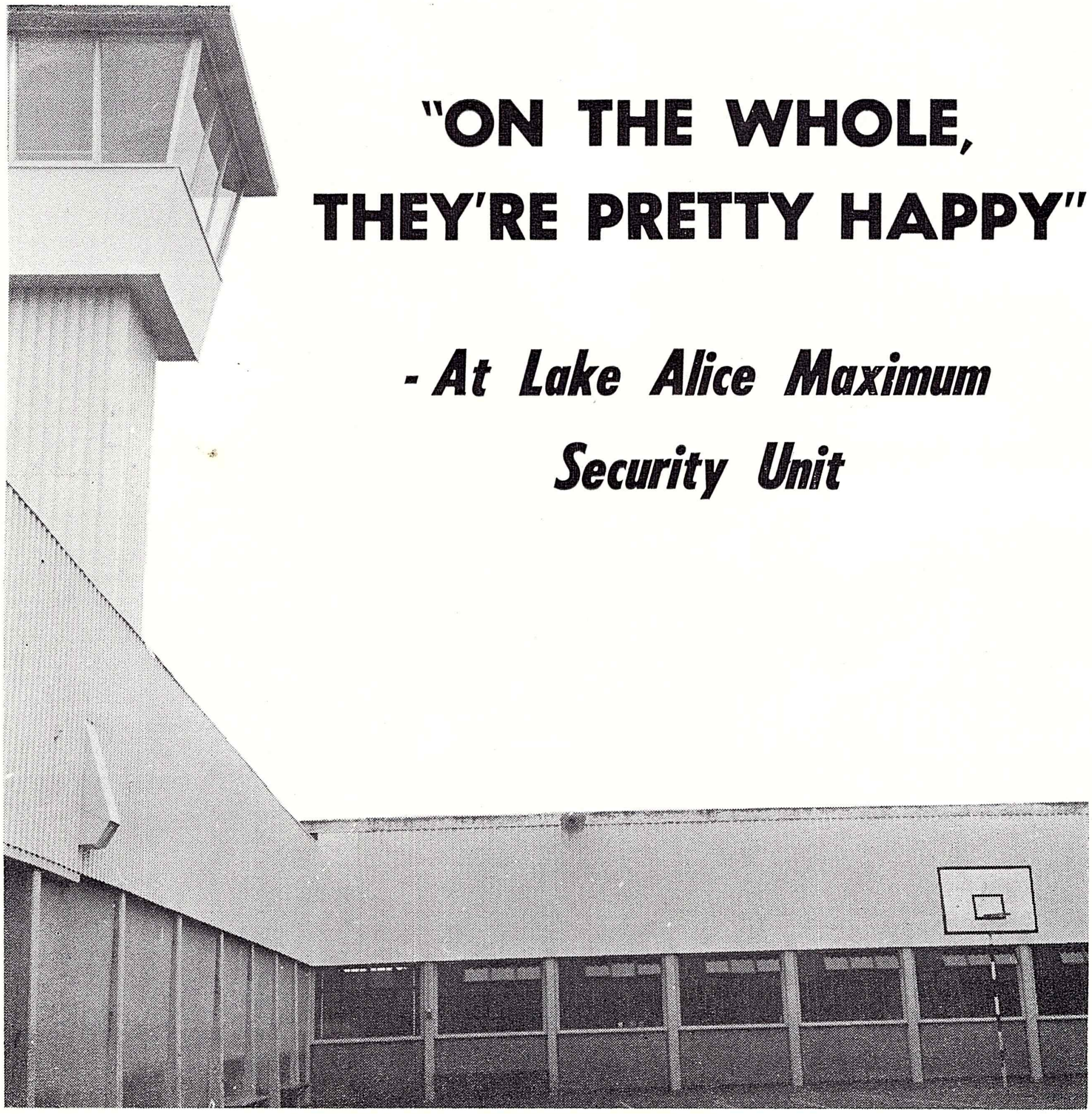
Underground mining men.





"ON THE WHOLE, THEY'RE PRETTY HAPPY"

- At Lake Alice Maximum Security Unit



The tower is manned when inmates exercise.

Other than knowing that a coal-fired boiler supplies heat for Lake Alice Maximum Security Unit, we had no idea of what to expect when "Coal" arrived to see this mental hospital.

Lake Alice Maximum Security Unit is six miles from Marton, or midway between Palmerston North and Wanganui — 22 miles away from each city.

The security unit can accommodate up to 59 patients.

First, a pathway lined with roses — wilting in the autumn cold, but obviously an area of colour and scent when in full bloom.

Then a high wire fence, and a gate electrically opened and shut from within the hospital, only after positive identification.

Inside, a cheery male nurse — with keys attached by a chain to his belt. Every door throughout the building had to be unlocked as we were escorted through, and locked immediately we had passed through.

In the ceilings of all corridors and common rooms a closed-circuit television system monitored our progress and observed the patients at their various activities.

"We work on the incentive system," said our guide. "It's first names between all the patients and the staff. The patients don't have to go to bed until after television closes down each evening."

Only men are accommodated at the security unit at Lake Alice. The staff amounts to 40, two-thirds of whom are registered psychiatric nurses. The security unit is part of a larger hospital sharing the area, and is the only mental hospital still administered by the Health Department, since all others were handed to local hospital boards to administer.

Furniture

Six inmates were at work in the carpentry shop, making furniture.

"The younger boys are o.k. in the workshop," the instructor told us. "The older men are usually too set in their ways."

The furniture in the office of the Director of Mental Health in the Health Department was made at Lake Alice.

Through another locked door where we found 25 patients were at work at another form of occupational therapy.

Rocking chairs, bright basketwork, colourful sheepskin car seat covers and moccasins: these products are sold at a profit to cover cost of materials.

"We take a truck load to the RNZAF station up the road at Ohakea, or to the Women's Division of Federated Farmers, the Easter Show at Bulls or even up to Waiouru," said the supervising male nurse, explaining how the inmates' work is sold.

"We're making 40 pairs of slippers a week."

Approximately $1000 worth of goods a month are made in Lake Alice, with enough work commissioned to keep patients busy three months ahead. The men are moved from job to job to prevent boredom, unless they prefer a particular occupation.

A small printing press prepares dispensary labels for the main hospital, and prints Christmas cards or invitations.

Hobbies

Through another locked door is the hobbies room. Here flying model aeroplanes were hanging from the ceiling, and paintings showed that some inmates had artistic interests.

An average of eight patients are discharged from Lake Alice every year. Every six months a review committee checks patients who are improving to keep in touch with their progress.

A dining room, common room, and visitors' room are included in the complex. A record player in the library provides for those who prefer music to television.

A teacher spends two evenings a week instructing some of the patients, 20 of whom are studying by correspondence, and a fulltime appointee is in the process of joining the staff.

The central court has yards for exercise outdoors, for tennis in summer and basketball in winter.

Television

Past the staff dining room, a quick look at the one-man rooms with Reidoprene mattresses and electric razors, and back to the entrance. Adjacent is the room where 11 television screens can be switched to the various monitoring cameras.

"What's your favourite programme?" we asked the nurse on duty.

"Coronation Street!"

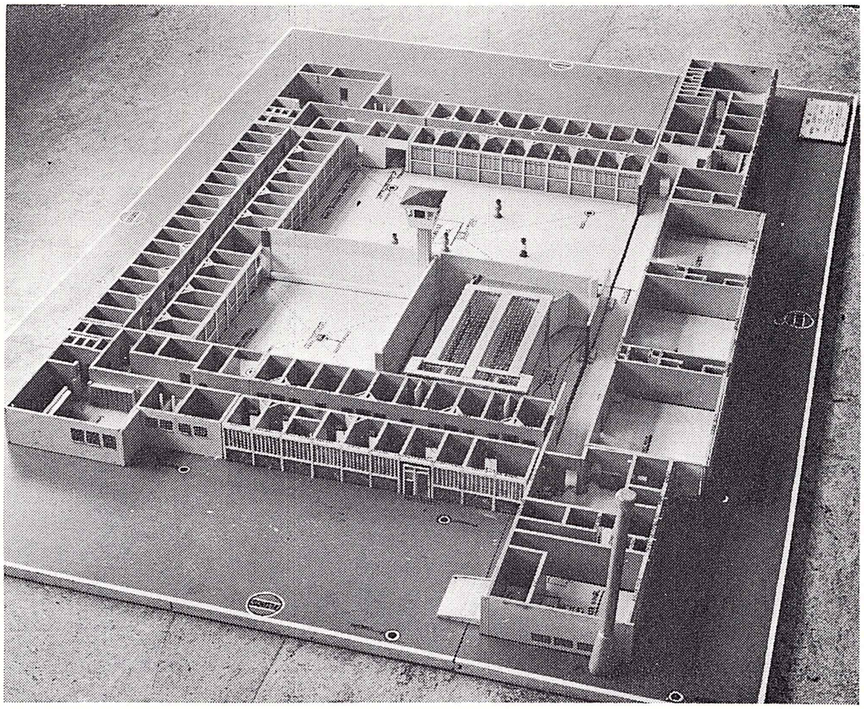
Two hours at a time is enough when watching the television monitors, we were told. Then the nurses swap duties.

"We are nursing people," the staff men on duty said in describing their work. "This is not like a prison — the relationship is different."

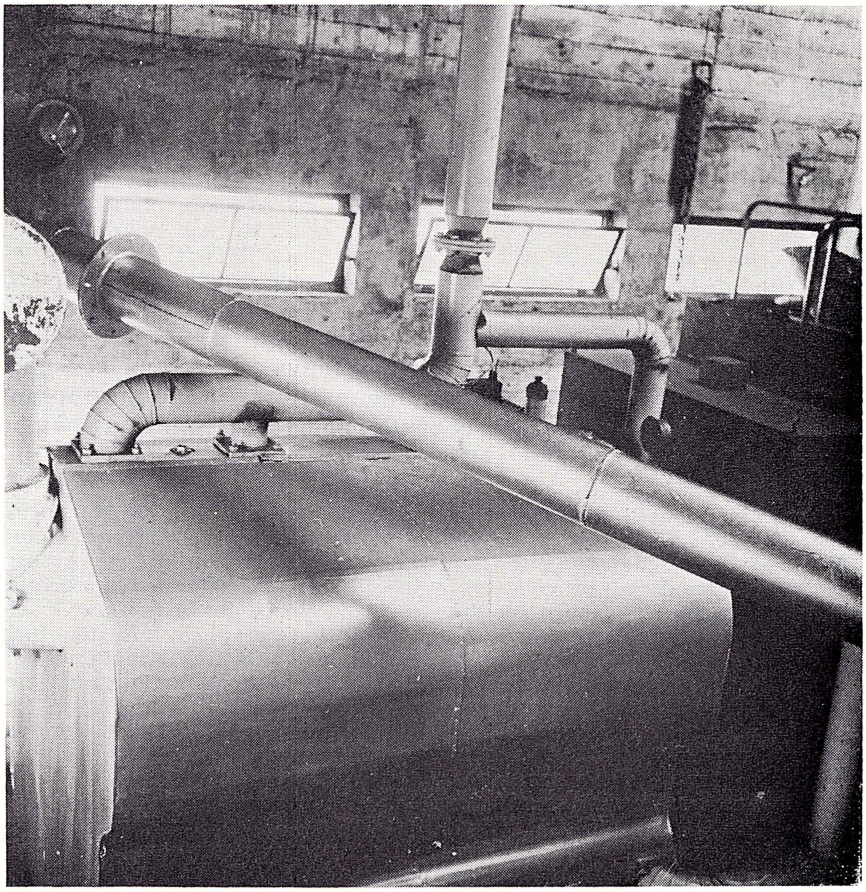
And the patients?

"On the whole, they're pretty happy," we were assured.

In this atmosphere of bright paintwork, light varnished woodwork and contented activity this is not to be wondered at and we are happy to know that coal plays well its part at Lake Alice by providing the warmth so necessary to bodily contentment.

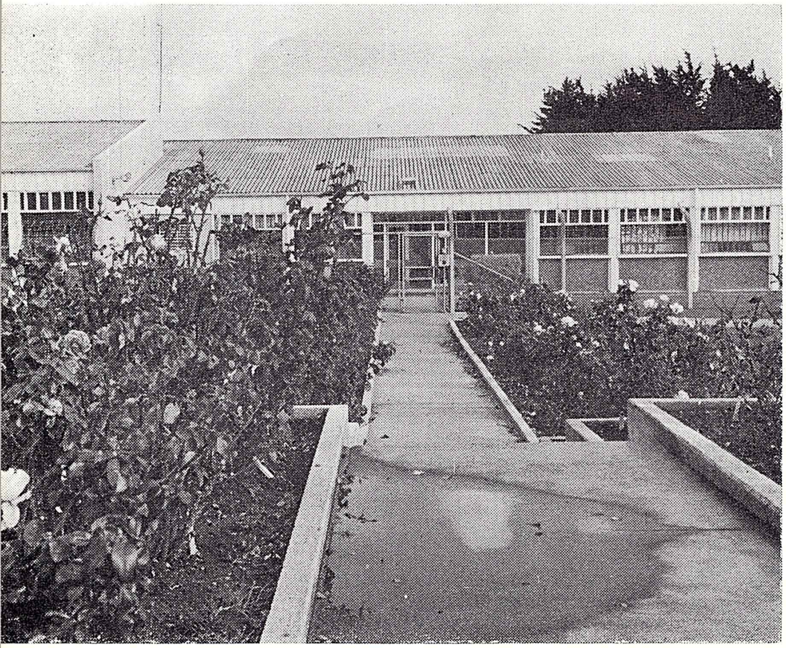


This model of Lake Alice Maximum Security Unit shows layout. Boilerhouse is in foreground.

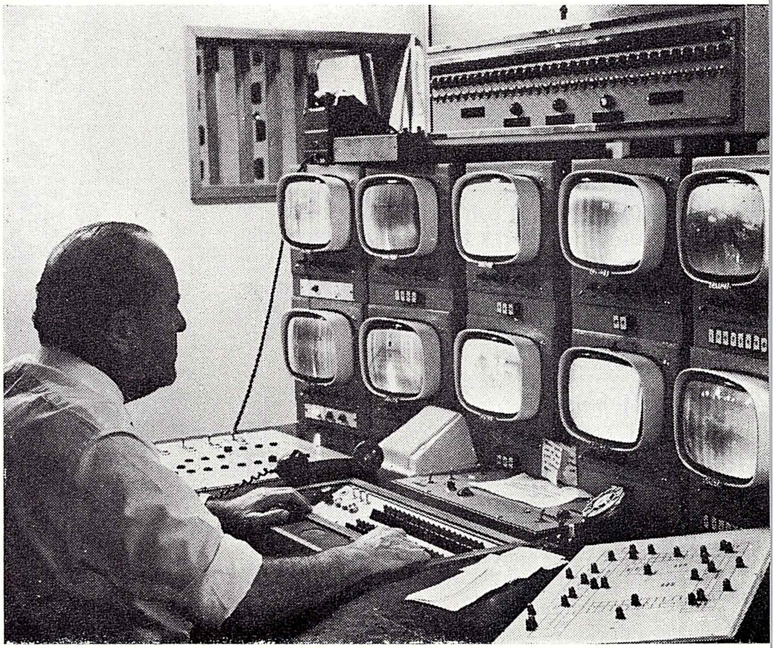


A Robin Colonel 10 section boiler, capable of 1,419,000 BTUs supplies low pressure hot water for building heat, and hot water services. A Robin Hood "F" pattern six section boiler with a 271, 700 BTUs capacity is also in use at Lake Alice. Both boilers have Suxe stokers, feeding Waikato pea grade coal.

LAKE ALICE MAXIMUM SECURITY UNIT (Conclusion)



A pathway lined with rose bushes.



Constant surveillance of patients with closed-circuit television.

MORRY BASSICK

Secretary of United Mine Workers

Elected National Secretary of the United Mineworkers' Union, Mr Morry Bassick of Huntly succeeds the late Mr J. Dellaway in this position.

"With the experience he will get in this position he will, I am sure, equal the high standard set by past National Secretaries," Mr A. V. Prendiville, President of United Mineworkers, says.

"There is no doubt he will carry out the duties entrusted to him in an honest and efficient way."

Mr Bassick has been in the coal mining industry for a number of years and takes an active interest in the various organisations in the Huntly area. He has been secretary to the Alison Miners' Union and a delegate, representing Huntly miners, to the United Mineworkers' Union.

RETIRING ALLOWANCE

The Coal Mining Districts' Welfare and Research Council has added a clause to the rules for retiring allowances.

The new clause is:

"7. All applications must be made within 12 months of retirement from the coal mining industry".

While the coal industry is aware of competition from its liquid equivalent in the fossil fuel business, the reaction of oil to the appearance of some coal men at one South Island coal mine was quite unexpected.

A fuel technologist, two State Coal representatives and a journalist had arrived to see a new type of machine which uses hydraulics.

Such an abundance of coal representatives seemed too much for the latent feelings of the oil, pent up in its reservoir.

With its force aroused, it blew a hydraulic pipe, treated the visitors to a display of a gusher as could be expected from the first well of a Troubleshooters' type bonanza, and began to menace the visitors with its spray.

The sightseers did not stand on ceremony. They took off in different directions, all four showing remarkable running powers for their years. When a State Coal man stumbled and went down the journalist ran over the top of him.

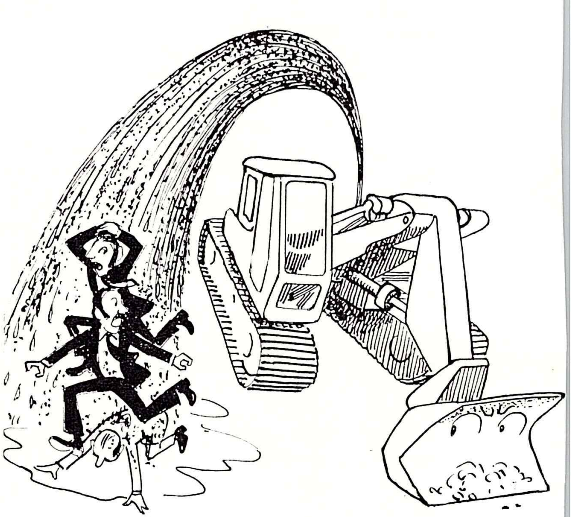
Specially singled out for the treatment, however, was the fuel technologist. The spray from the gusher lanced down and saturated him before he could escape out of range.

With the spray cut off, the fuel technologist was heard muttering in the quietness about the unpredictable viciousness of oil.

Wet through, he made off for his car in search of a clean shirt and a towel.

"If it had been coal I could have brushed it off!" he complained. "Why does the opposition have to take it out on me?"

Nothing has since persuaded him that his misadventure was not chance, and was not in fact deliberate enmity by the pent-up oil in the unoffending machinery towards a man who has done much to prove to customers the efficiency and cost savings through using coal.



STRONGMAN NUTS MAKE MARTON TILES

"Strongman nuts with some Liverpool is our choice of coal. We've had a good run with it and it is the ideal fuel for tiles," says Mr Hill, foreman-manager of the Marton Junction Brick and Tile Co. Operating for 60-odd years, the company today produces 9000 or more four-inch tiles in one firing.

Twelve fireplaces, six on each of two sides of the downdraught kiln, provide the heating and usually the kiln is fired once a week. Rangitikei, the surrounding county, provides a continuing market for the tiles because the very heavy clay-class country needs drainage.

Clay is obtained from the company's own property, with many years' supply available yet. Originally extending over 14 acres, the clay seam is 14 feet thick with almost no overburden. A contractor uses a rotary hoe and a front-end loader to stockpile about 2000 yards of clay at a time, ready for use.

Marton clay has proved popular with potters. Last year over 2400 lb of clay were supplied to Wanganui for schools.

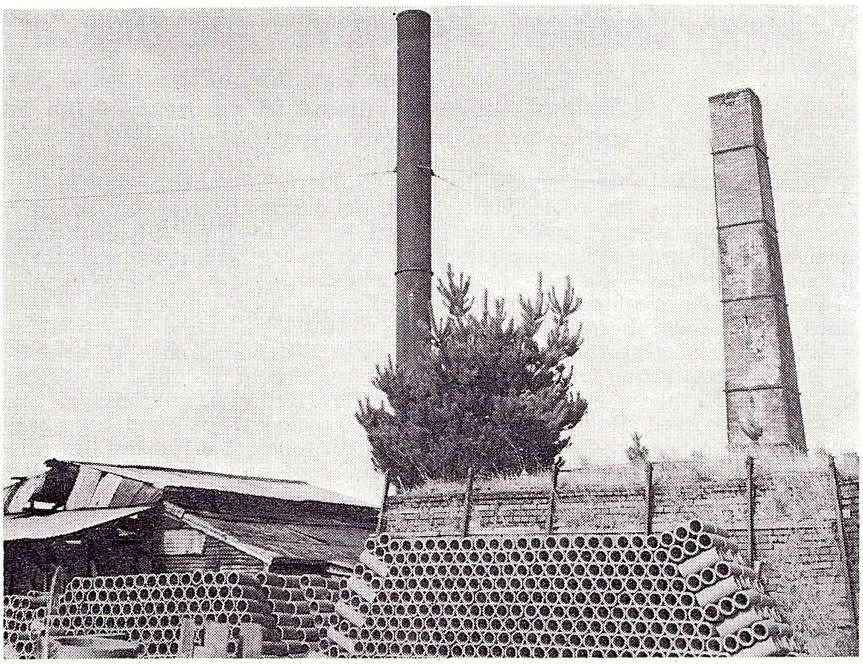
When a private school in Marton closed down, local people opened a centre in the building for weaving, pottery and other handicrafts. The kiln undertakes all the biscuit firing for the local potters, with a nominal charge for fitting hobby work into odd places in the kiln. When the first firing is completed, the different glazes need different kiln temperatures and these are provided in the potters' own kilns.

Mr Hill can display a basin he made himself on the potter's wheel, "just for fun", but disclaims any intention to let pottery become a hobby to him.

He is no stranger to coal. His father worked in a coal mine for a brief period, and Mr Hill originally worked with coal at the Marton gas works until it closed.

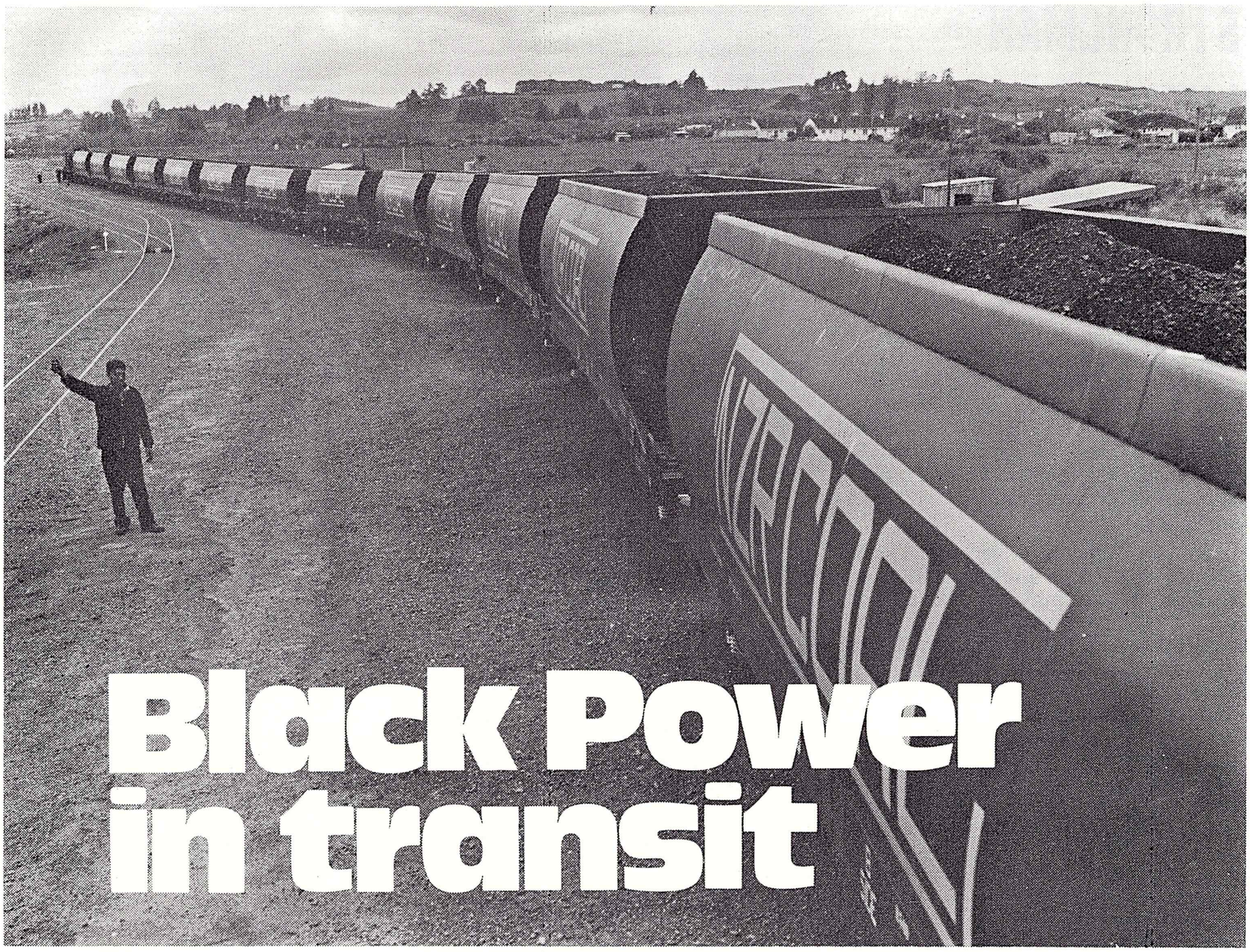
The kiln is only one of Marton's industries. Sawmills, a large panel-beating business and the Kakariki woollen mills (also a coal user) help provide work for the 5000 population.

Mr F. Hill (left) of the Marton tile factory shows pottery made by local potters to Mr K. Paul of the Coal Research Association.



Rangitikei county with its heavy soils needs drainage.

Black Power in transit



'C' class coal wagons.

New Zealand Railways service to the coal industry

Every year more than one million tons of coal is carried by New Zealand Railways, almost 10 per cent of the total freight tonnage carried by rail in this country.

Once the basic energy source for railway operations the coal industry today continues to rank among New Zealand Railways' most important freight customers.

The importance of customer relations is far from lost on Railways which in recent years has developed a modern marketing approach to business.

Trevor Hayward, Railways' Assistant General Manager, Operating and Commercial, expresses his department's attitude when he says: "We're under no illusions about our future. We've got to provide the services our customers need if we are to survive as a viable concern, earning the support of industry.

"Our job is transporting goods. Our revenue comes from moving them, not storing them in wagons. What it boils down to is no mileage — no revenue.

"Railways' interests, as well as those of our customers, can only be served best by moving freight to its destination as quickly and as economically as possible."

Four Different

Four different classes of open-top wagons, the C, La, Lc, and Q, are used by Railways to transport coal. The C class wagon, first introduced in 1969, has the highest carrying capacity of any New Zealand Railways' wagon. Forty-seven feet long, these all-steel wagons can each carry 43 tons of coal and were designed primarily to carry fuel from the Huntly coalfield to the New Zealand Steel Company's Glenbrook mill.

The pear-shaped hopper has an opening 6 ft 2 in. wide running the full length of its top so that coal can be loaded from overhead bins. At the mill the coal is discharged into underground bins through three pairs of doors set transversely in the bottom of the hopper. The doors are operated simultaneously by compressed-air cylinders controlled by a valve. These wagons, of which 20 have been built, are designed to work in solid block, or "liner", trains that shuttle between the Huntly coal mines and the mill.

Several hundred Q class hopper wagons, first introduced many years ago, are still in use for the short hauls from mines to tidewater on the West Coast of the South Island. With a removable bottom-discharge hopper, these wagons were developed for the specific job of carrying coal for discharge into coastal vessels at Westport and Greymouth.

Highside Wagons

The versatility of the 12-ton

capacity La and the 15-ton capacity Le highside wagons used to distribute coal to centres of industrial and domestic consumption is in part the reason why they are in such demand for transporting a wide variety of other commodities. Essentially general-purpose wagons they are also used to carry products such as grain, wool, cement, salt and fertiliser.

With a fleet of some 29,000 wagons, representing an investment of about $75 million, Railways sees its task in freight haulage as maximum utilisation of the wagon fleet to provide the best possible service to customers and to gain maximum return from this massive investment in rolling stock.

The mammoth task of keeping these wagons on the move over 3000 miles of track is easier said than done. At any one time many of these wagons are tied up in sidings around the country with a resultant loss of potential revenue to both Railways and its customers.

Despite the best efforts, bad weather, a sudden upswing in the demand for a certain commodity, or worse a sudden increase in demand from several industries at the same time, or wagon repairs, can all disrupt the flow of wagons and produce headaches for Railways' wagon supply staff and the customer.

Temporary Difficulties

A prime example of the serious effects these factors can have was highlighted earlier this year by temporary difficulties in moving West Coast coal. A drought in Marlborough and Canterbury kept grain supplies for hard-hit farmers on the move over a much longer period than usual. At the same time wet weather elsewhere delayed unloading of lime and phosphate consignments. On top of this the general upsurge in business activity this year has generated more rail traffic. All these factors upset wagon supplies, created bottlenecks at rail terminals, and prevented a fast turnround of wagons.

Productivity gains in transport and goods distribution have, in the past, depended largely on the development of new machinery. In recent years Railways have made large gains in productivity, with new and more powerful motive power, containerisation, pallets, and extensive use of mechanised freight handling equipment.

Railways are approaching the task of improving wagon utilisation and supply from several directions. A large wagon building programme is underway, not only to provide additional highside wagons, but to build box wagons capable of carrying goods presently railed in highsiders. A number of Lp wagons, now used to carry newsprint traffic, are being converted to Lc wagons after being replaced by new Lpa and other classes of wagons.

Continuous Process

The maintenance and repair of wagons is a continuing process which at any one time means up to 10 per cent of Railways' La and Lc wagons will be out of service. While an allowance is made for this percentage in assessing normal wagon requirements

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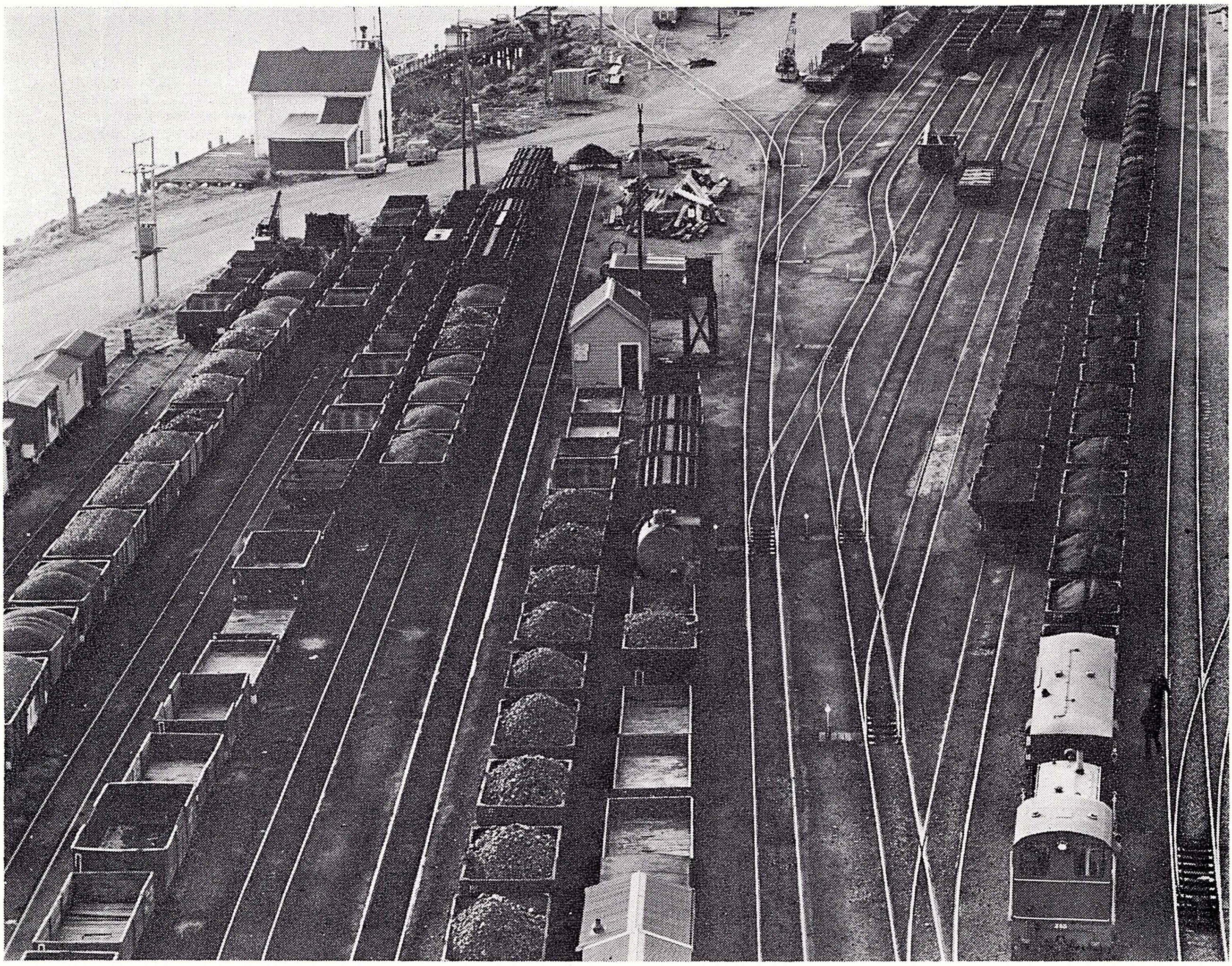
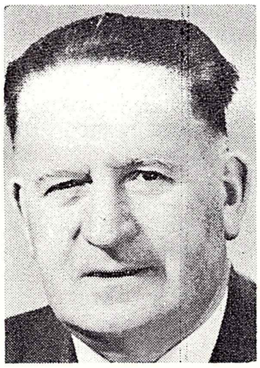


"Q" class wagons with coal being shunted at Westport.

"Bigger than ever"

MINERS' LEADER REVIEWS COAL CONFERENCE



Mr A. V. Prendiville.

"The general feeling at the Miners' International meeting in Geneva, is that coal will come back into its own in a bigger way than ever," Mr A. V. Prendiville, president of the United Mineworkers, told "Coal".

Mr Prendiville represented Asia at the conference, which was held on May 19, 20 and 21. Other countries represented were Germany, France, Britain, U.S.A. and Africa.

"There was a tremendous amount of discussion about the coal mining industry generally," Mr Prendiville said.

"The Trades Union Congress in Britain have now taken up the cudgels on behalf of coal and are demanding that all oil-burning industrial equipment return to coal use and much greater use be made of coal generally."

Mr Prendiville stated that the conference members said that the price of oil is rising throughout the world."

"It's getting completely out of bounds. In one State in America the price doubled almost overnight. At present there are many shortages of oil throughout the world and prices will rise considerably in the next two years."

In New Zealand, Mr Prendiville said, a 50 per cent increase in the price of oil can be expected within two years.

"It has already increased by 40 per cent in Victoria during the last two years, and is still rising."

The Miners' International expected, as a result of these prospective rises, that in the not-too-distant future countries will have to use coal in greater quantities because of shortages and costs of oil.

"That's about the position as the conference members saw it," he said.

Mechanisation

Mr Prendiville said that overseas the trend for some years has been for increasing mechanisation, so that very little hand mining is done in the major coal producing countries.

"America for instance, had 450,000 miners 20 years ago. They're down to 125,000 and are still producing as much coal, but it's getting more pricey."

Coal at the mine mouth in America costs double the price of coal at New Zealand mines, Mr Prendiville said.

One concern of the conference was the conditions and wages at Asian and African mines. Wages at such mines would not work out more than $1½ per day.

New Zealand conditions compare favourably with conditions in coal mining in any country in the world, he said. Apart from America, the wages also compare with the best.

Mr Prendiville met many friends at the conference, and many were very interested in the proposed work of the Labour Government. Accident compensation, superannuation and unemployment reduction schemes were points of particular interest.

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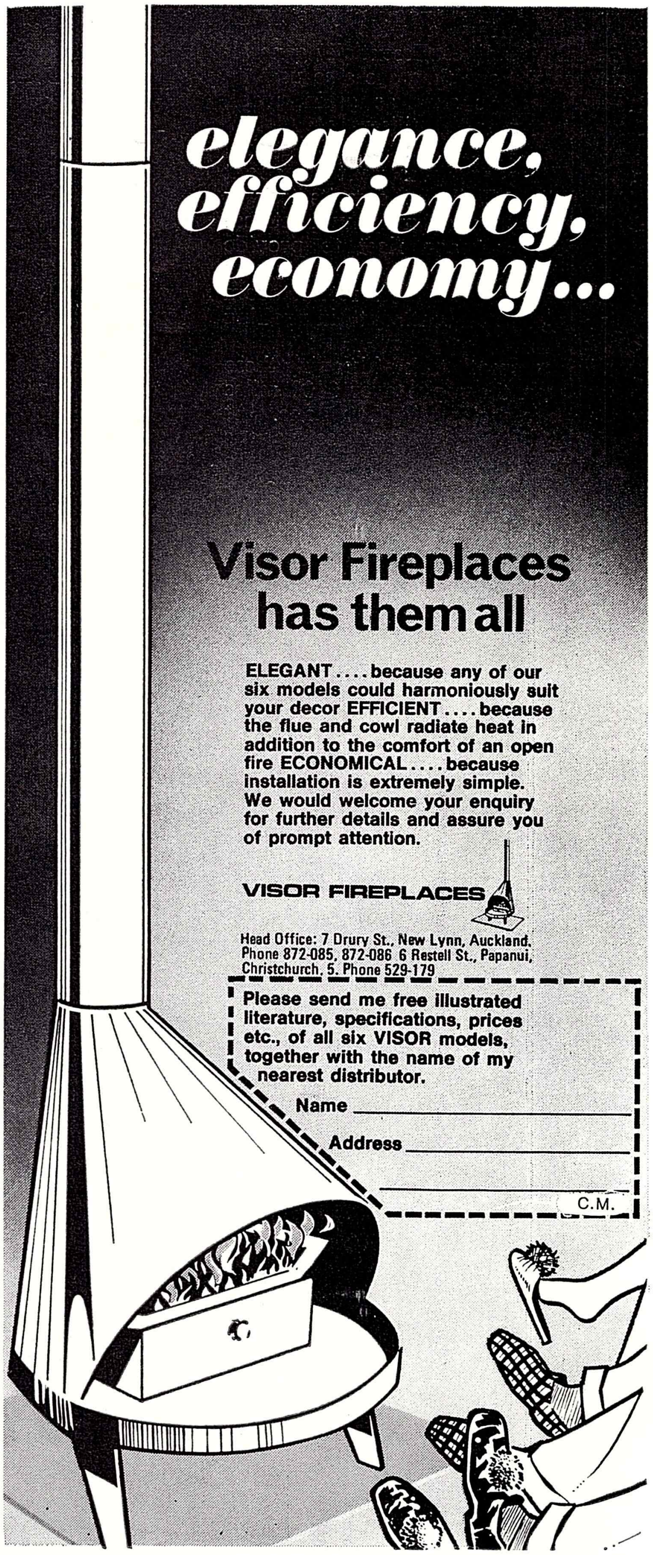

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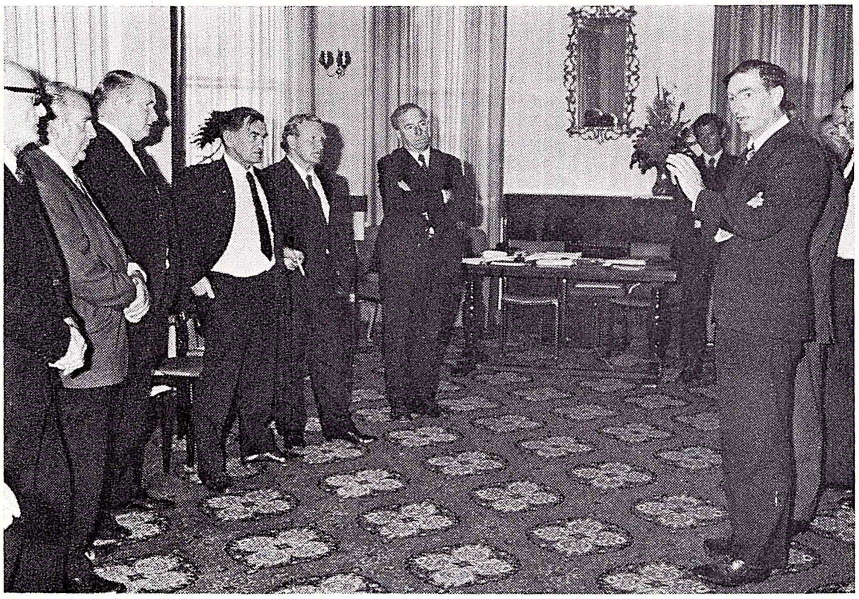
CAREERS in MINING

(II)

State Coal Mines sales staff

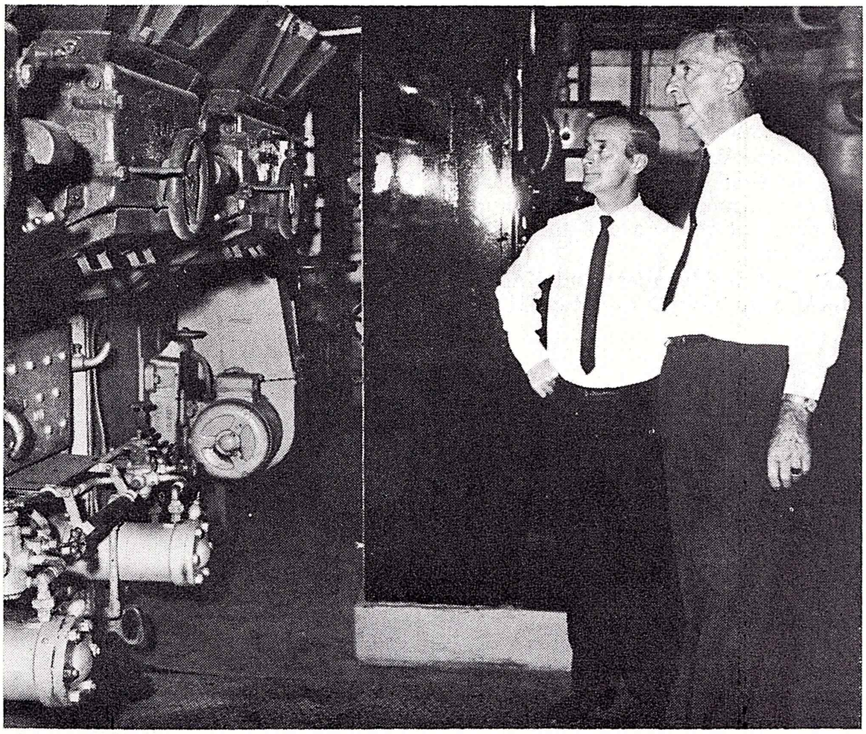


The Head Office Sales Manager and a depot manager join South Island coal merchants at a gathering in Invercargill to discuss coal with the Hon. F. M. Colman, Minister of Mines.

Opportunities in the competitive worlds of sales and sales promotion are available in State Coal Mines.

With demands for energy increasing with the pace of technology, coal competes with other energy forms for markets. Salesmen selling the products of State Coal Mines are selling a form of energy with immense reserves, both within and outside New Zealand, that exceed other energy reserves several times over.

Modern coal-using equipment has automated the old hand-firing methods, and burns coal almost smokelessly. As industry in New Zealand expands, and an increasingly affluent society looks for more comfort in the home, both industrial and domestic opportunities for coal markets offer a challenge for future salesmen to promote New Zealand's leading indigenous fuel.



A State Coal depot manager and a private coal merchant on a visit to an Auckland factory using coal.

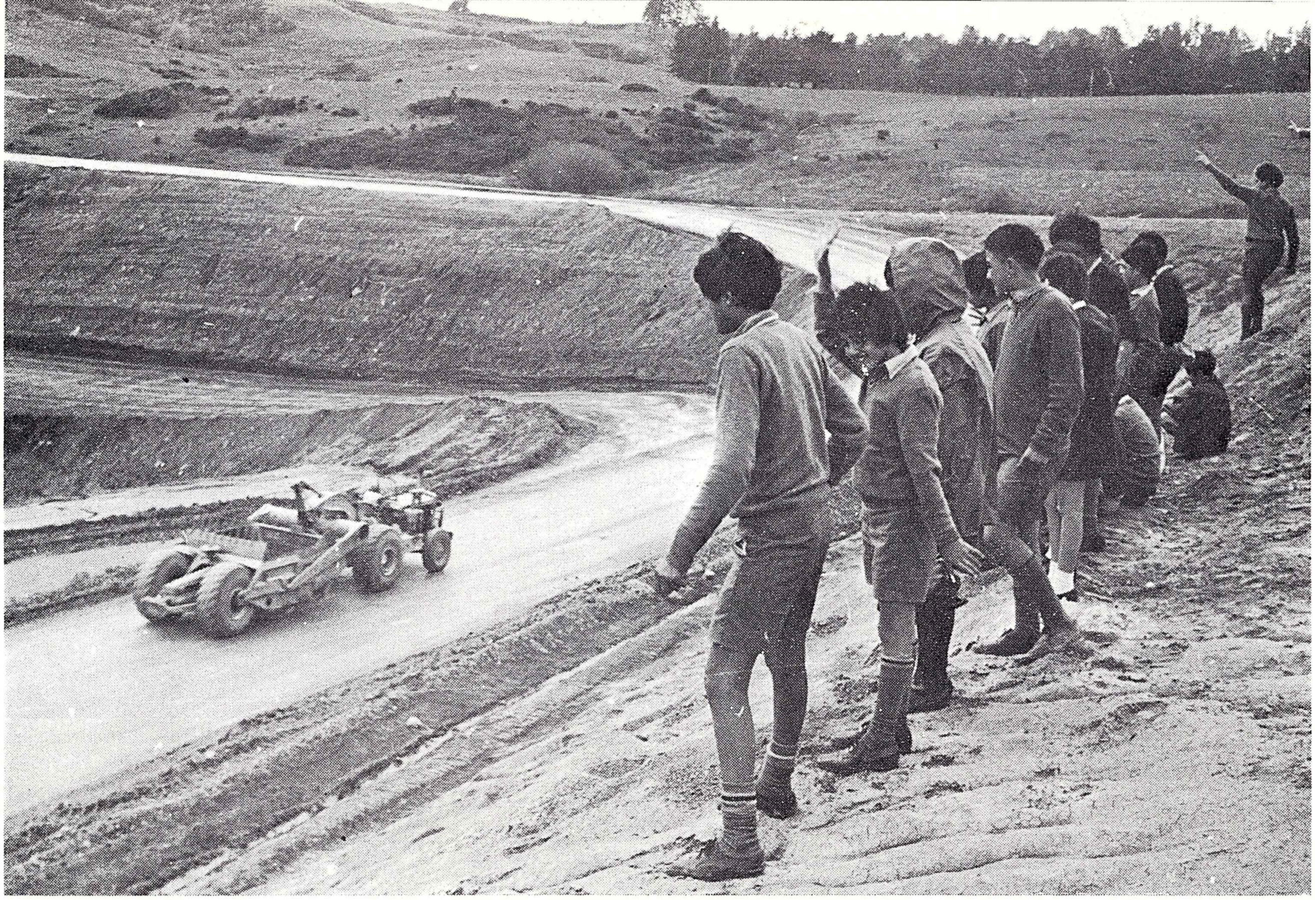
Potential salesmen in State Coal can progress from basic grade, to senior clerk, and eventually to branch manager in the sales and distribution branches in the four main centres. A branch managerial position is usually a stepping stone to the Manager of Head Office Sales.

A thorough grounding in the coal industry is essential for the modern salesman. Knowledge of the types of coal from the different mines; of the size of the product required for different uses; of methods of transport (road, rail and shipping); and of the commercial world and its operation are all needed for a coal salesman's background.

Advertising, marketing, sales promotion, and public relations: these are associated skills or techniques of which a salesman or manager must have a working knowledge. A salesman has to maintain contact with customers and producers, and the work offers considerable variety and usually some travel from day to day.

State Coal Mines sales staff meet their opposite numbers in private enterprise coal organisations in conferences and on social occasions, to discuss mutual interests in the coal sales promotion activity and consumer servicing.

Some flair for selling, and a readiness to learn the workings of a large industry with a secure future: these are the basic requirements of the man prepared to work for State Coal Mines, selling and servicing the product of the largest energy source in New Zealand.



James Waititi waves while seeing a coal mine for the first time. His comment on the trip: "I thought Meremere Power Station was immensely big and that it had so many engines, turbines and many other huge things. I also thought that your work was highly dangerous if some of your workers did something wrong when they push a wrong switch or button."

FIRST VISIT TO A COAL MINE

At the eastern extremity of the Bay of Plenty, the Whangaparaoa farming settlement was provided with mains power by the Bay of Plenty Electric Power Board for the first time only two years ago.

Previously, writes the headmaster of Whangaparaoa School, Mr C. D. Wilson, the 41 children at the school knew of electricity "only as a chugging diesel generator of various vintage".

"In order to change this concept I decided to spend one day at the Meremere Power Station and its 'feeder' the Kopuku State Coalmine," he said.

Opotiki, 75 miles to the east, and Gisborne 131 miles around the coast are the nearest towns to the school. It is very seldom that the school children ever visit either of these towns, so each year four schools on the coast combine to raise money to send the forms I and II pupils on an educational tour.

"These tours are very necessary," Mr Wilson says. "The isolation and remoteness for these children means they do not leave their environment and cannot benefit educationally. For the form I children each year it is the greatest distance they have ever travelled."

For the 37 children from forms I and II of Whangaparaoa, Raukokore, Potaka and Waikura station schools it was the first time they were able to visit a coal mine, a power station, and for many of them, a city the size of Hamilton.

As well as Meremere and Kopuku, which were visited on May 31, the children visited the Waikato Winter Show, Radio Waikato, Innes Tartan (soft drink manufacturer), Hamilton Toll Exchange and the Waikato Teachers' College. The children called on Mrs D. C. Jelicich M.P., and were taken on a boat trip on the Waikato river.

"Whakakotahitanga Schools" arrive in the Waikato to see a coal mine and Meremere Power Station.

These are some of the comments — unedited — made by the children for "Coal" after their visit:

Michael Tangohau: *I thought it was very interesting to see where our power came from and to see what different machines there were.*

Robert Kara: *My thoughts are if I work in the Meremere Power Station I might get electrocuted and also I am not fond of heights. When the train come with the coal I thought I might work on it as the driver. I was also interested in the pay the men get.*

I was interested in the pay especially I think it is a very good job to earn money. I might really work there one day because it is for men that work.

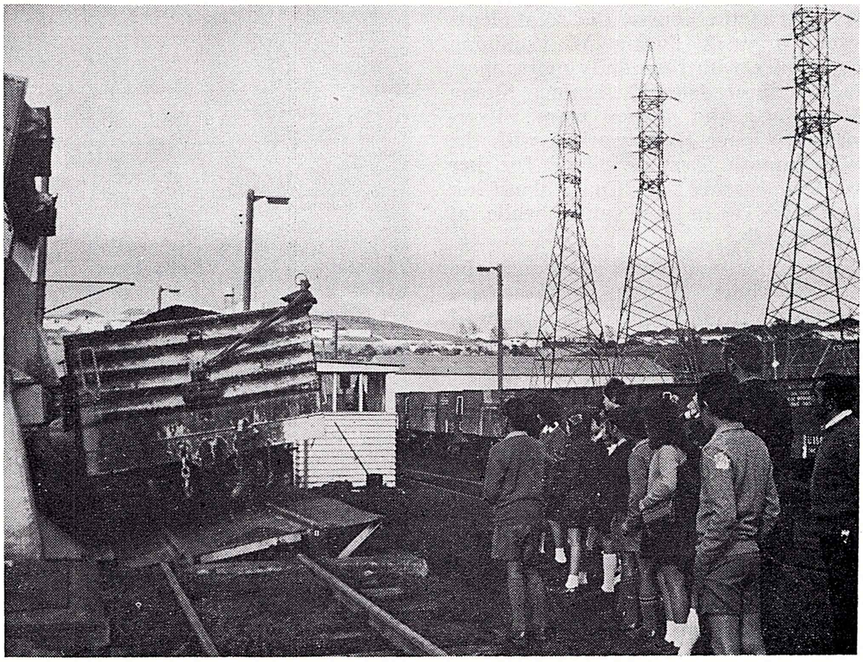
Don Komene: *When I first arrived to Meremere Power Station I felt all free. That was the first time I have ever seen a big power station. It is a very interesting place to look at.*

Bruce Barlow: *I thought Meremere Power Station was a gigantic powerhouse, and I wondered how much electricity it generated. Questions buzzed through my head how much coal did it use in a day?*

Heeni Maangi: *When I saw the power station, I thought of it as a kind of big place. When we were right at the top of the building it felt funny cause I had never been so high above the ground in my life.*

(Concluded on page 41)

Elvis Shepherd (centre) with Bruce Barlow (left) and Edward Ruwhiu. Elvis wrote: "I thought about how much money was taken into building the power station and how long it took to build it. I thought about how and when the open cast mine was found and how long it took to build the six mile line that took all the coal to the Power Station.



Some of the children watching coal unloading.

So much coal! From left, Eva Hicks, Celia Butler, Mini Wharepapa, Lena McClutchie, Ngaire Broughton, Puti Kemara, and Florence Taitua. In the background, Thomas Teneti climbs high above the others for a good look.

TRAINEE JOURNALISTS VISIT A COAL MINE

Wellington Polytechnic operates an annual course for trainee journalists. As part of the course, the 46 students spent a week during May gaining experience with four daily newspapers in the South Island. Trainee Shona Valentine, who comes from Silverstream, Upper Hutt, worked with the "Greymouth Evening Star" for her week and writes for "Coal" about her first visit to a coal mine while at Greymouth.

Six miles north of Greymouth the narrow, short, hilly road into a West Coast forest ends where the overhead sign proclaims "Strongman Mine".

The small mine entrance offers no inkling of the fervent activity within its 60 miles of tunnelling.

But before you have time to wonder at the silence, which is interrupted only by the sound of coal laden wagons being railed out, you are escorted into an office. After each visitor signs a document accepting full responsibility for any injury he may receive in the mine, friendly staff introduce themselves, welcome you to the Strongman mine and leave you with a guide.

Five of us, all Wellington Polytechnic journalism students, and our tutor, Mr Keith Gunn, visited the mine. We were spending a week working in Greymouth gathering stories for the "Greymouth Evening Star", as part of our practical training.

Hong

"My name's Hong", said the cheery guide.

We each donned lanterned helmets and a respirator. Hong led us into the mine in single file.

The air was cold and damp, the ground a little slippery and the tunnel ceiling a little low in some places but Hong entertained us. He spoke of miners and their skilled techniques, of the history of the mine, of the mine construction and of amusing incidents experienced by previous visitors.

And the buckets of coal rumbled past out to the sunlight. Each was initialled in chalk so that each man's work could be tallied.

Shona Valentine (front row, left) with Sally Middleton and tutor Mr Keith Gunn about to go below for the first time. Classmates in the back row, left to right are: Dene McKenzie, John Mehaffey and Brian Lawlor. Mr Gunn came from Greymouth originally, and took a load of stones back to Wellington in the boot of his car — not so much for sentimental reasons, as to top off a wall in his garden.

The air remained fresh all the way because of the sophisticated air circulation system. The ground became firm and dry and coal crunched under foot.

Leaving the main tunnel Hong led the way downhill and round corners to the source of some of those laden buckets.

The tunnel ended at two dust-coated faces beaming in our direction. Picks in hand, the miners explained what they were doing.

They chipped away at the coal and then began shovelling it into a bucket. They filled two. Then they began reinforcing the tunnel with hand-cut wooden pillars.

A striking thing about the miners is their versatility. A miner has to pick, shovel, chop timber, use a drill and reinforce a tunnel.

Specially trained men called shot firers actually do the blasting after the miners have prepared the face.

Before the shot firer blasted the coal loose the miners sprinkled lime over the face to damp down any gas that could leak out as a result of the explosion. After the blast the air was tested for gas, and again after drilling.

All lamps are put out and there is utter darkness until a tiny flame tests the air for danger.

Coal dust, airborne after the explosion, soon settled. We moved on to watch another nearby party at work.

Quick

The miners worked quickly and efficiently. None of them leaned on pick or shovel handles, but they were not tense or subdued. Confidence and gaiety prevailed and they took an obvious pride in their work. They are not as dependent on machinery as on physical manpower.

Our party headed back, passing empty buckets on their way down. Hong tugged at a rope on the side of a corner to let anyone above know not to send down any more until we were past the steep climb.

As laymen, we could have asked so many questions. How the miners know where to dig, the safety precautions each miner takes and whether the idea of safety is constantly in their minds, what breaks the monotony of each day and what each miner perceives the future will hold for him and for the industry in general.

TRAINEE JOURNALISTS

Tunnels branched in all directions to follow the coal seams, some exhaustive and others still productive. The lights on our helmets bobbed onward.

We stopped on the way back to see a ventilation transfer chamber. Leaving it, Hong puzzled us by slamming a pressure-equalising door at a particular moment. He asked two wearers of spectacles if their specs were still on. Both were. Hong seemed a little disappointed. We had a feeling that those firmly-attached spectacles sort of spoilt Hong's day.

We connected with the main tunnel and headed for daylight.

The outside air felt warm. Hong showed us the platform where coal is weighed before being dumped into the delivery hopper for trucking out, all by road.

The outbuildings and offices were simple, as to be expected, as the Strongman mine began 36 years ago.

We were very well received at the mine and it was an unusual experience. But it was good to be able to look at the portal to all that blackness from the outside.

Students from the Wellington Polytechnic Journalism Course visit Shantytown and make the acquaintance of the working steam engine presented by the Mines Department to the re-creation of a West Coast goldrush era township, during their week with the "Greymouth Evening Star". From left to right, Sue Fanning, Dene McKenzie, Brent Melville, Sue Cross, John Mehaffey, Sally Middleton, Russell Scoular and Jeanie Stewart.

FIRST VISIT TO A COALMINE

(Concluded from page 39)

Pare Taitua: *My thoughts are that the power station was worth while visiting and learn a great deal about the different kinds of jobs that are done there. The open cast mine is a beautiful place.*

David Oarson: *When I visited Meremere Power Station I was so interested and excited in where they get coal from. The big building was just like a big factory.*

George McDonald: *I thought it looked very interesting and dangerous. The mine looked very deep and black.*

Harold Barlow: *The power station looked kind of big from down where we were and there was coal everywhere. There was a lot of noise when we went in but we slowly got used to it as we were climbing the stairs going up to the top. I liked watching those trucks tear around the mine getting filled and coming back again.*

Aroha Maangi: *I thought the Meremere Power Station was interesting to see because I have never seen a power station before.*

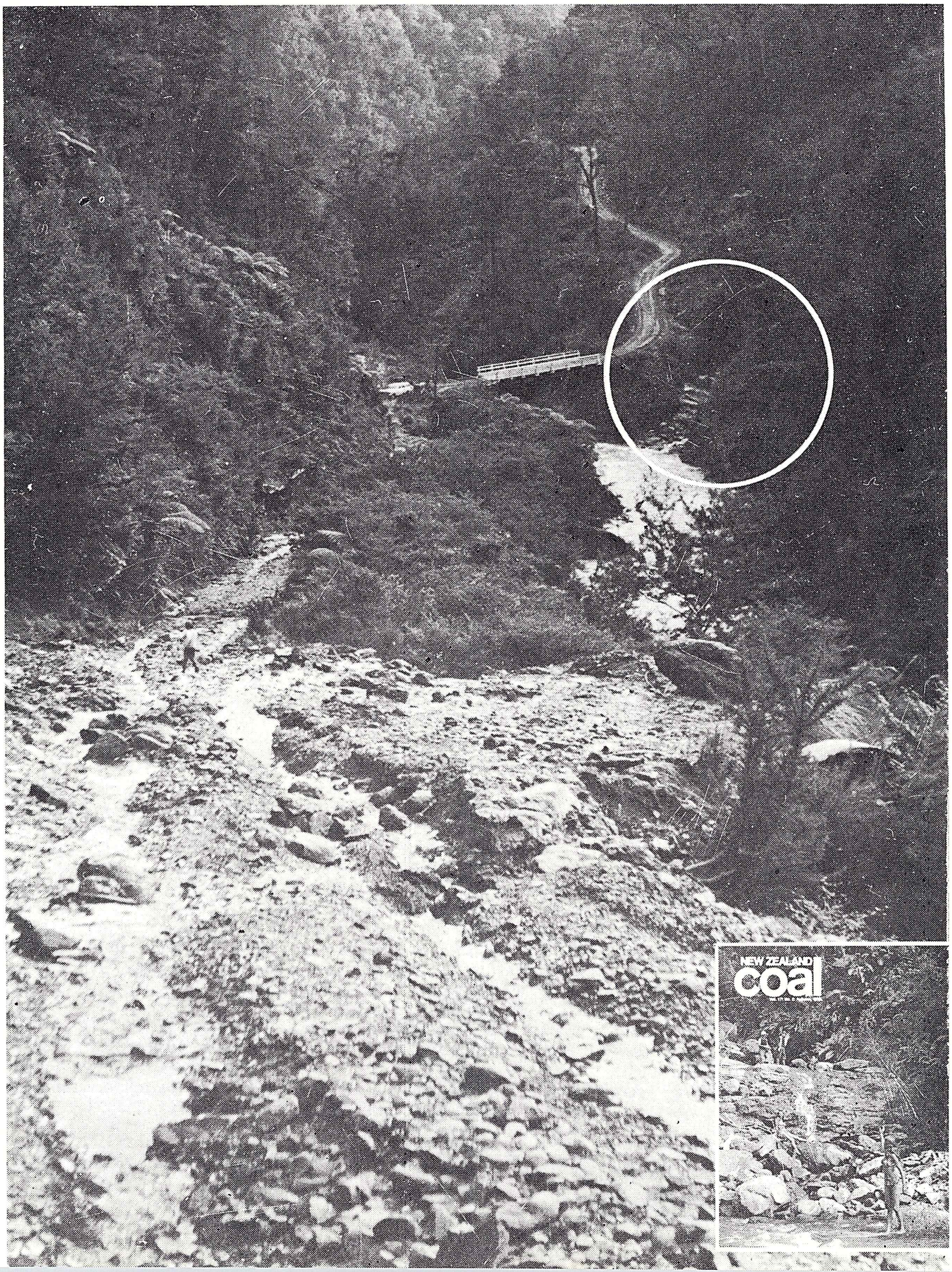
Mahia Maangi: *When I visited the Meremere Power Station I thought that it was a very dangerous place to work at and how enormous the station is. I thought it was a very interesting place to be shown around. I enjoyed myself there and I hope I might see that huge power station again. There are so many gadgets that some people wouldn't no which one to work on.*

SLIPS BLOCK MINE ACCESS

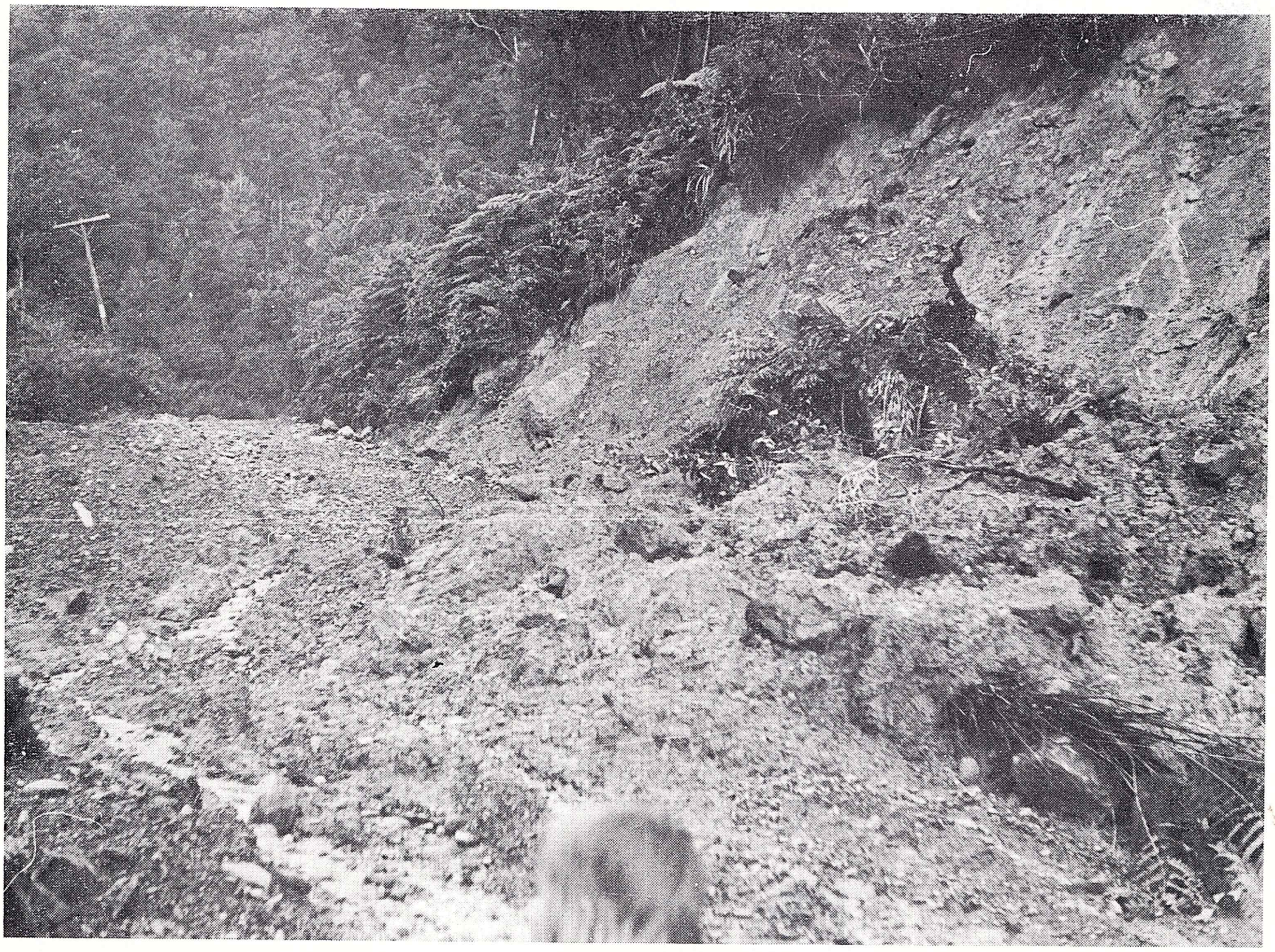
Slips which blocked the access to five private coal mines in the Ten Mile Valley in May posed a problem for clearing the debris away. Officially, the Grey County Council said, the roads did not exist. The Mines Department, the miners employed at the mines concerned and the local Catchment Board have paid for maintaining the road in the past.

The Grey County Council was granted $2,500 immediately by the Minister of Mines, the Hon. F. M. Colman, after the county telegraphed the minister to explain the predicament of the local body in financing repairs.

This photograph shows the site (marked) of "Coal's" cover picture for the Autumn issue this year, and the photograph on the opposite page gives another close-up view of one of the slips.



SLIPS BLOCK MINE ACCESS



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District News

– BULLER –

Correspondent: BILL MILLER

The Junior All Blacks visited the Escarpment Mine when the team was at Westport recently. Members split into three parties and were taken to various sections of the mine, where they were shown phases of mining. Some tried the pick and banjo. After 2½ hours at the mine they returned to Westport for a late lunch and departure by aircraft.

We have had a lot of visits from schools and colleges during the winter, and more will be coming.

Coaltown: One of the attractions of the Coaltown Museum (see "Coal" Autumn 1973) could be a model of the Denniston Incline. It is hoped to fit the model on a float for the Centennial Procession and afterwards keep the model in the museum. Coaltown is the former Morley Brewery, which has been given to the Buller by the new owners, Dominion Breweries.

The buildings will be set out to house various old-time activities, such as an old-time brewery, and a mining section that will show how coal mining has advanced through the years.

At present the committee organising Coaltown is asking for old photos and relics of the district, to be included in the museum. Each item will be displayed in its proper group, and will have a placard telling its story.

If you have anything you think is suitable, please write to Coaltown, P.O. Box 7, Westport; all gifts will be given full credit.

Coaltown is intended to commemorate coal on the West Coast, as Shantytown at Greymouth commemorates goldmining on the Coast. However, in its conception and layout it will differ considerably from Shantytown, and by complementing the Greymouth tourist attraction Coaltown will be adding to the Coast's growing tourist amenities as well as showing the history of coal.

Westports' centennial will be held in October.

Births: To Chris and Caroline Teichert — a daughter. To Les and Pat Maloney — a son.

Deaths: Jim Stevenson, of Hector.

21st Birthday: Joe Beveridge, of Waimangaroa.

Office News: Dawn Davies has returned from her Pacific and Far East holiday, and is settling down to work after a wonderful trip. Many are the stories being told about a colourful holiday — it is no trouble to get Dawn to talk of her experiences. Just mention some of the places she visited and away she goes — isn't it great to have wonderful memories?

Jim Hope, who was our mining engineer for many years, and who is now with the DSIR, visited us for three days in June. It was good to see him again.

Ernie and Jean Hansen, of Hansen's Garage, Granity, with winners of prizes in the competition held to celebrate 25 years of service to the coal-mining community.

Sport: Rugby — United (Waimangaroa) won the senior shield for 1973, defeating Ngakawau on Saturday, June 23, by 10 points to 3.

HANSEN'S GARAGE, GRANITY
25 Years' Service to Coal-mining Community

Ernie Hansen came to Granity 25 years ago, and liked what he saw. He married a local girl and began a garage that is still going strong and gives him cause for pride.

In appreciation of his 25 years in business Ernie and his wife Jean, decided to have a sales promotion, a competition and goodwill supplement in the Westport "News". The competition was a word game and this was appreciated by young and old, as seen by the very large entry. The competition was to see how many words can be made out of the letters in the word GRANITY.

First: Miss L. Shearer (111 words); second, Mrs M. Luff (102); third, Miss R. Batt. Consolation prizes: Miss P. Coleman, Mrs F. Shearer, Miss C. Coleman, Master G. Luff, Miss Debra Smallholme, Mr A. Straker, Mrs L. Shearer, Mrs W. Nicholson and Miss S. Byrne.

To end the celebrations Ernie and Jean Hansen held an open day at the garage on Saturday, June 30. They provided everything in the way of eats and drinks (you name it, they had it!) and the afternoon ended happily when the prize winners of the competition were announced and prizes presented.

Congratulations, Ernie and Jean, on a job well done — I am sure your effort has been appreciated by the coal-mining community.

– HUNTLY –

OBITUARY: Mr Herbert Peden of Huntly, who died recently, was a retired coal miner who had taken considerable interest in union activities.

Born in Scotland in 1908, he immigrated to New Zealand at 16, in 1924. He was first employed at Glen Afton Collieries, and became secretary of the Glen Afton Miners' Union at 19.

In 1932 he transferred to Glen Afton Collieries No. 2 Mine (McDonald Mine) and was secretary of the McDonald Miners' Union until he retired in 1967.

During World War II he was Government appointee to the National Coal Board and was elected member of the local Disputes Committee.

Mr Peden established a reputation for his advice and guidance in compensation cases, for members of various organisations in the district as well as his own union. On retiring he became president of the Waikato Carbonisation Workers' Union and secretary of the Engine Drivers' and Fitters' Union, positions he held until his death.

A talented musician, in his early days he taught both violin and saxophone, and with his brothers had contracts to play at silent films, dances and at 1ZM Manurewa.

As a mark of the esteem in which the Maori community held him, Queen Te Ata-i-rangi-kaahu bestowed upon him the honour of a chief by placing a Korowai on his coffin.

Mr Peden is survived by his wife, one son, two daughters and six grandchildren.

– COALGATE –

Opened 45 years ago, the Klondike Mine at Coalgate has closed.

At its peak, in World War II, the Klondike employed 22 men extracting more than 10,000 tons of coal per year. It was shipped as far away as Kaikoura, Arthur's Pass, Timaru and Fairlie as well as local deliveries within a 40-mile radius.

A fire in 1966 caused the mine to be flooded, for 2 months, losing thousands of tons of coal. It was then leased to five men of the Coalgate Coal Company who have operated the mine up to its closing.

Mr Charles Green, co-discoverer with "Shiny Bob" Smith of the Klondike seam, still lives at Coalgate.

"It has employed the Lord-knows-how-many people, and paid I-don't-know-what in wages, and served the whole of Canterbury for 45 years," he said. "It seems such a shame that it is just allowed to die, closed and forgotten.

Mr Green still clearly recalls living in a wooden-floored tent in Bush Gully and cycling once a week into Coalgate as the money dwindled.

The "smell of an oily rag" on which, Mr Green said, they had been living for a while was supplemented in 1928 by the smell of coal and just a whiff of machinery.

"Shiny Bob" had gone long ago, prospecting elsewhere, but Mr Green stayed. The seam was steep, machinery costs grew steeper, but the mine grew slowly and prospered.

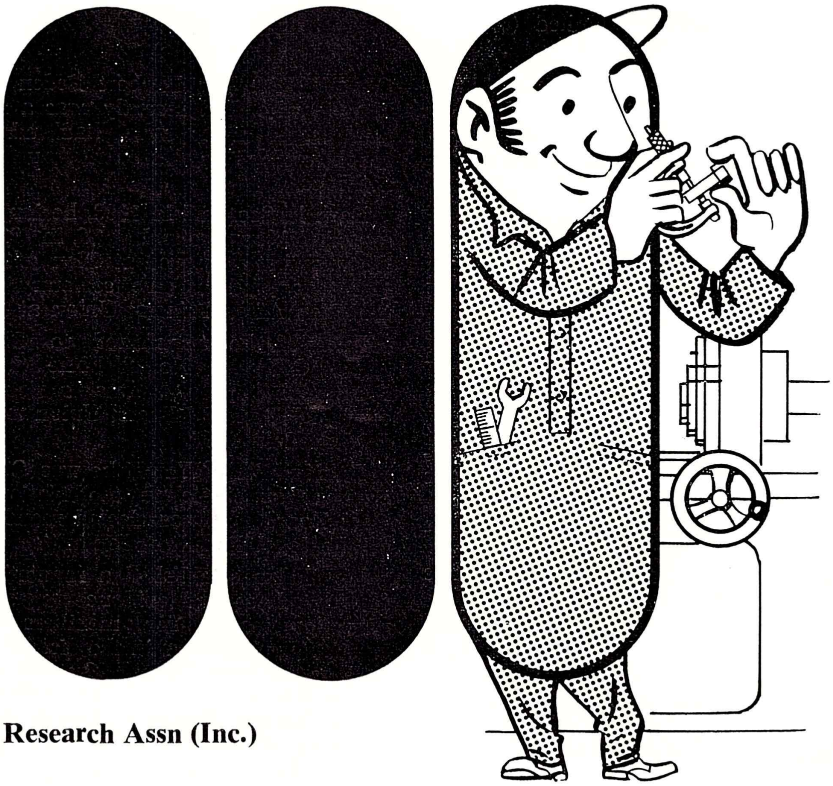
Now all the economically-workable coal has been exhausted.

"If it weren't for that damned fire we'd be going today," Mr Green said.

The Hon. F. M. Colman, Minister of Mines, chaired the quarterly meeting of the Coal Mining Districts' Welfare and Research Council in June. From left, Mr N. S. Mason (Wellington District Public Trustee), Mr W. Cunliffe (secretary), Minister, Mr I. D. Dick (Secretary of Mines), and Mr A. V. Prendiville (United Mineworkers).

N.Z. COAL RESEARCH ASSOCIATION (INC.)

METRICS in the BOILER HOUSE



by P. A. Toynbee Director, N.Z. Coal Research Assn (Inc.)

It is all very well to bemoan the fact that this present era has been selected for converting all phases of life to metric measurements. Metrication brings probably more problems to engineers than to people in other walks of life, but despite our conviction that it should have been foisted on to some other generation, this phenomenon of metrics will not go away. We have to live with it and we have to learn the conversions from our Imperial system to the new "Systeme International" with its S.I. units.

Depending on the age of the engineer, the conversion to metrics is likely to be applied differently. The older engineer is more likely to continue to think in the system he has grown up with, and convert the data he has in his head from Imperial units to metric — for instance he will continue to think of a flue-gas velocity as (say) 30 feet per second, and he will convert this to metric units. The younger man with more years ahead of him, obviously would be wiser to change his way of thinking and to retain in his mind all the essential data in metric units. In either case, he still has to understand the numerical factors for conversion from one system to the other.

Conversions of weight, length, area, volume and temperature are relatively simple and present no greater problem to the engineer than they do to the layman. However, when we get into boilerhouse technology, concerned with units of energy, power, pressure, and with specification of standard conditions under which gas volumes are measured, life becomes more complicated. It is with these units that this article is mostly concerned.

Simplification

Most of the units in the boilerhouse relate to heat, energy and power and it is perhaps in this field that metrication can achieve the greatest simplification. Our old world of Imperial units, although we were used to it, was a complicated and confusing world.

We have the pound as the unit of mass. The unit of force was the poundal, the force required to accelerate a mass of one pound at one foot per second per second. (Another unit, the pound-force or pound-weight, was made 32 times as great as the poundal). A force in moving a mass, achieves work or expends energy, and the amount of energy or work was the foot-pound — a pound-force acting through one foot. Power is the rate of doing work or expending energy, and our time-honoured standard was the horsepower which, in the dark ages, was fixed by the assumption that a horse was able to expend work at 550 foot-pounds per second or 33,000 foot-pounds per minute.

Converting to electrical energy was awkward with one horse-power being equivalent to 0.7457 kilowatts. Conversion of power to units of heat was no less awkward with one horsepower being equivalent to 2544 Btu/hr. One kilowatt was equivalent to 3412 Btu/hr or, expressed in units of energy, 3412 Btu's were equivalent to one kilowatt-hour.

Metrics

Metrication brings a system so much simpler.

The unit of force is the newton. This is the force which accelerates a kilogram at one metre per second per second. A force of one newton achieves work or gives energy equal to one joule when it acts through one metre. Power, the rate of doing work, is in units of joules per second, which unit is equivalent to a watt. In terms of energy, the watt-second is equivalent to the joule.

By its early definition, a watt was chosen to fit in with the metric system for energy and power discussed above, and by avoiding the complications of the mechanical equivalents of heat and of electricity — so confusing in the Imperial system — the metric system achieves its greatest simplicity.

So, in units of heat we have the joule being used in place of the British thermal unit, the therm, the calorie (itself a metric unit), and being equal to a watt-second. In power or heat output, we have the watt in place of the unit of Btu/hr or, in the case of a steam boiler, in the place of pounds of steam per hour.

With force, we have the newton in place of the poundal, the pound weight and the kilogram weight.

The unit of pressure is a completely new unit — the pascal — which is equivalent to one newton per square metre. This replaces the Imperial units of pressure — the pound per square inch, the inch water gauge and the inch of mercury.

With electrical units, the system remains unchanged — watts, kilowatts and megawatts are retained.

Base Units

In the S.I. system of metrication, the base units are metres, kilograms, and seconds, and retaining these units without converting to decimal multiples is encouraged. This practice can give rise to very small or very large numbers and in practical use, some multiple units are retained — for example, grams and tonnes (1000 kilograms), millimetres, and kilometres.

From these base units are derived the units discussed above for energy, force and power — the joule, J (kg m^2 s^{-2}), the newton, N (J m^{-1}) and the watt, W (J s^{-1}).

Decimal Multiples

Decimal multiples and sub-multiples of the S.I. units, are generally in steps of a thousand. The prefixes used and the symbols, are as shown below:

Prefix	Symbol	Factor
mega	M	1 000 000
kilo	k	1 000
milli	m	1/1 000
micro	μ	1/1 000 000

In metrics, a gap should be used instead of a comma to divide large numbers into sets of three digits — as shown in the above table.

CONVERSION CHART

The chart summarises the units used in boiler house practice with the appropriate factors for converting from the Imperial system to the metric system.

QUANTITY	IMPERIAL UNIT	METRIC UNIT	CONVERSION
Length	inch	millimetre	1 inch = 25.40 mm
	foot	metre	1 foot = 0.3048 m
Area	square foot	square metre	1 sq. ft. = 0.09290 m^2
Volume	cubic inch	millilitre	1 cu. in. = 16.39 ml
	cubic foot	cubic metre	1 cu. ft. = 0.02832 m^3
	gallon	litre	1 gal. = 4.456 l
	gallon	cubic metre	1 gal. = 0.004546 m^3
Mass	ounce	gram	1 oz = 28.35 g
	pound	kilogram	1 lb = 0.4536 kg
	ton	tonne	1 ton = 1.016 tonne
Force	pound-force	newton	1 lb.f = 4.448 N
Energy	B.T.U.	kilojoule	1 Btu = 1.055 kJ
	kilowatt-hour	megajoule	1 kWh = 3.600 MJ
	therm	megajoule	1 therm = 105.5 MJ
Specific Energy	B.T.U. per pound	megajoule per kilogram	1 Btu/lb = 0.002326 MJ kg^{-1}
Power	B.T.U. per hour	kilowatt	1 Btu/hr = 0.0002931 kW
	pound of steam per hour	megawatt	1 lb/hr = 0.0002845 MW
	horse power	kilowatt	1 H.P. = 0.7457 kW
Pressure	pound per sq. inch	kilopascal	1 psi = 6.895 kPa
	inch water gauge	kilopascal	1 in w.g. = 0.2491 kPa
	atmosphere	kilopascal	1 at. = 101.3 kPa
Density	pound per cubic foot	kilogram per cubic metre	1 lb/cu.ft. = 16.02 kg m^{-3}
Dust Loading	grain per cubic foot	milligram per cubic metre	1 grain/cu.ft.= 2288 mg m^{-3}

Temperature: To convert °F to °C, subtract 32 and divide by 1.8.

Boilerhouse Technology

Conversion to the metric system for the various units relating to boilerhouse operation are described in greater detail:

Energy: the kilojoule is approximately equal to the British thermal unit (1 Btu = 1.055 kJ). In practice, energy is generally expressed as megajoules.

Specific Energy: "Specific energy" is the new term for "calorific value". It is generally expressed in megajoules per kilogram — a coal with a calorific value of 10,000 Btu/lb has a specific energy of 23.26 MJ/kg.

Power: Conversion of horsepower to the metric units of kilowatts, is achieved by multiplying by 0.7457.

Where we have expressed the heat output of a boiler in Btu/hr for hot-water boilers, and in pounds of steam per hour for steam boilers, we now use kilowatts and megawatts.

Generally, steam outputs have been expressed as pounds of steam generated at atmospheric pressure from boiling water at 212°F — "steam from and at 212" — where the heat content of the steam is the latent heat of evaporation at atmospheric pressure, i.e. 970.6 Btu/lb. Actual evaporation rates were normally converted to this common basis. For instance, the steam tables show us that the heat of steam at 180 psig produced from feed water at 180°F, is 1051 Btu/lb. Thus, one pound of steam produced under these conditions is equivalent to 1051/970.6, or 1.083 pounds of steam from and at 212.

To convert steam quantities in pounds per hour to metric units of power, megawatts, we divide by 3515 That is, a one megawatt boiler has an evaporative capacity of 3515 pounds per hour of steam from and at 212. In the case of hot-water boilers, the output in Btu/hr is divided by 3412 to convert to kilowatts.

Pressure: The standard atmospheric pressures of 760 mm (29.92") of mercury, expressed in S.I. units, becomes 101.325 kilopascals. The bar, equal to 100 kPa, is used only in meteorology.

Boiler pressures in pounds per square inch are converted to metric units, generally the kilopascal, KPa, by multiplying by 6.89476.

To convert gauge pressure to absolute pressure, the atmospheric pressure of 101.325 kPa is added. For example, 100 psig is equivalent to 689.476 plus 101.325, or 790.801 kPa in absolute units.

For the lower pressures encountered with air flows and in fan engineering, inches water gauge are converted to kilopascals by multiplying by 0.2491 or, in some cases, simply to millimetres water gauge.

Standard Atmosphere: Various standards have been used in the past for defining the temperature and pressure under which gas volumes are measured. The British gas industry has used 60°F and 30" mercury with the gas saturated with water vapour under these conditions. In America, the standard has been dry gas at 60°F and 760 mm of mercury. The standard for continental and scientific work, dry gas at 0°C and 760 mm of mercury, now becomes the metric standard. The change in the volumetric standards can be calculated from the changes in temperature and pressure — for instance a volume, V, of gas under conditions of 60°F and 30" mercury becomes 0.949V when measured under 0°C and 760 mm of mercury.

CLEAN AIR COUNCIL INITIATES APPLIANCE TESTS

At a recent meeting of the Clean Air Council it was decided to set up separate committees to study motor vehicle, Clean Air Zones and rural pollution.

The Clean Air Zone Committee will investigate financial assistance needed where Clean Air Zones are considered necessary.

The chairman of the council, Mr L. Evans, said the council will recommend a programme for testing coal and oil burning space-heating appliances. "We need to identify which appliances are suitable for Clean Air Zones," he said.

Among its duties the Rural Pollution Committee will study problems of air pollution from burn-offs and wood waste disposal.

"The council agreed that some form of control on motor vehicle exhausts should be introduced soon," Mr Evans said.

New Zealand will have to decide whether to follow United States, Australian or European standards of exhaust emission control. A committee to investigate this further was set up under Mr J. E. Fitzgerald, Borough Engineer of the Mt Wellington Borough Council.

New refinery facilities being built in New Zealand will make it possible to reduce the lead content in petrol, and the council wants the lead level in air to be monitored to see how this pollution can be reduced.

Overseas technical developments would probably be sufficiently rapid that no serious traffic pollution problems need arise in New Zealand, but it would be desirable to legislate to ensure that these developments are available here.

Crankcase exhaust ventilation and a limit on maximum carbon monoxide at idle could be introduced immediately for new cars, the council decided.

Mr Evans said that the six-monthly Warrant of Fitness check gives New Zealand an advantage over other countries in providing a form of supervision.

"The necessity for more restrictive controls than these will arise," he said.

"BIGGER THAN EVER"

(Concluded from page 36)

Discussing mines safety, Mr Prendiville said it is a big problem throughout the world.

"I believe that we have probably the best safety regulations in the world. Taking it by and large, we have less major accidents than any other country in the world."

He said that there is a tremendous amount of mining education going on in various countries around the world. There are young miners' groups, and liaison officers who are doing their best to educate and organise miners.

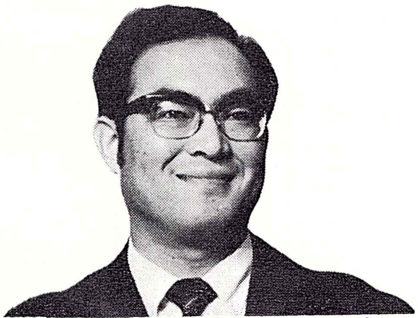
"This work is going on all the time," Mr Prendiville said. "The Miners' International Executive is playing a wonderful part as far as the coal mining industry is concerned, particularly in under - developed countries."

Executive meetings of the Miners' International are held either once or twice every two years, and general conferences where each country is represented every fourth year.

Next year a conference of Asian coal mining unions will probably be held.

GREYMOUTH BITUMINOUS BEST QUALITY for STEELMAKING

"Everything — from chopsticks to spacecraft," says Mr Ken Shiba, Director and General Manager of Ataka and Co. (N.Z.) Ltd, when "Coal" asked about his firm and its project of drilling for coal at Mt Davey, near Greymouth.



Mr Ken Shiba, Manager of Ataka (N.Z.) Ltd.

In Japan, the parent company's products include domestic steel, coal and petroleum, iron and steel rolling plant, industrial machinery, machine tools, textiles, scientific and electronic equipment, foodstuffs, cereals and meat, chemicals, plastics, knitted goods, wool, pulp and paper and modular housing.

"We believe Greymouth bituminous coal is the best quality in the world for steel-making purposes," he says when asked why Ataka has been drilling at Mt Davey.

"We began drilling last year and made three holes. We couldn't get any core sample from one of the holes.

"Core samples from the other holes were sent to Japan for analysis. This was very good quality bituminous coal with a low sulphur content and an unbelievably low ash content.

"We need this kind of coal in Japan to reduce air pollution. The Government doesn't allow imports of any high sulphur content coal."

Mr Shiba says that when the second stage of drilling was completed in June three holes had been drilled but two of the three were abandoned because Mt Davey is difficult ground for drilling on account of fault lines.

Approximately 22 ft of coal, belonging to the sub-Morgan coal seam were struck.

"If we successfully completed the three holes we could have decided about the mining operation, or whether to withdraw," Mr Shiba says. "Our purpose is to reach coal under 1800 ft — the sub-Morgan seam, which is below the Kimble and Morgan seams. But before 1800 ft we struck trouble and therefore no result."

"When will you be making a third drilling?" we asked.

"I cannot say at the moment. Our geologists are still analysing the samples and reaching conclusions. We need at least five million tons before we can begin economical operations.

"If the geologists' report is favourable we can expect to begin in November this year."

Mr Shiba says that developing the mine will be no problem. Ataka expects to make a mine "mouse", almost like the Liverpool Mine, which is a one-way station. The existing railway is there to develop it.

Ataka has been drilling on Mt Davey for two years, having to suspend work in winter because of freezing conditions. Fault lines have been the only technical difficulties encountered.

Drilling equipment was transported to the drilling sites at Mt Davey by helicopter. Some hundreds of feet of drilling rods, fuel, drums, engines and winches and a large rig were all carried in by air this way.

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BLACK POWER IN TRANSIT

(Concluded from page 35)

a determined effort is being made to reduce this figure even further. As far as possible Railways synchronise wagon maintenance schedules with periods of low business activity. But when, as has happened this year, the usual periods of low activity don't eventuate, supply can be overextended and allocations disrupted.

Two Railways working parties are currently studying transport movement and goods handling methods. These studies will help lay down guidelines for development up to the year 2000 to meet future demands and achieve maximum operating, economic and customer advantages.

Upgrading of rail terminals will improve wagon turnround, speeding up the transfer of goods between rail and road. Development programmes are in train for Auckland, Napier-Hastings, Blenheim-Picton, Christchurch, and other centres.

Computerisation

Computerisation is another area offering exciting new possibilities in the more effective use of rolling stock. A Napier-based pilot scheme, in which a computer is being used to record continuously the status and location of railway wagons was inaugurated in July this year.

The pilot scheme is designed to sort out operational procedures for any future nation-wide expansion of the scheme. Trevor Hayward predicts the scheme could eventually have a tremendous impact on Railways' customer services.

Computerised wagon control will quickly provide railway staff with accurate and detailed information to improve wagon supply and to direct wagons more effectively to meet anticipated demands. To the customer the immediate benefit will be in knowing precisely where his goods are in the railway system and when they will arrive for unloading.

"No one denies that problems exist. The important thing is that they are recognised. We are doing everything possible, within our resources, to solve these problems," Trevor Hayward says.

"There is no benefit in holding large and costly reserves of wagons to meet sudden and infrequent demands for a particular wagon. If we are to gain the economies which make both industry and Railways truly productive we must obtain the optimum use of our resources. This is our aim."

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COAL AND OIL

Sir David Barran, Shell Transport and Trading Company Ltd. chairman, told the Coal Industry Society in England that by 1980 the share of natural gas in Britain's energy market will rise from 5 per cent to 18 per cent and nuclear energy from 3 per cent to 9 per cent.

"But the days of cheap oil have gone for ever," he warned. "If the present consumption trends continue, oil's present resources will be exhausted within 20 years."

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THINK METRIC

ENERGY PLANNING AND CONSERVATION

Mr R. J. Hogg.

An outline of the Ministry of Energy Resources, and its role in allocating New Zealand's energy resources given by the Commissioner of Energy Resources, Mr R. J. Hogg, to a symposium at Victoria University of Wellington, sponsored by the building services group of the New Zealand Institution of Engineers.

Economics of Energy Consumption

In this country we rely mainly on oil, coal and electricity as energy resources with somewhat smaller amounts of both natural and manufactured gas in use. We do not have all the figures we would like on the values of the various forms of energy at the various stages from production to final consumption, but a very rough estimate shows that the total annual expenditure on energy used in New Zealand amounts to roughly $450 million including taxes and subsidies.

This figure represents about 7 per cent of Gross Domestic Expenditure, the sum of personal expenditure on consumer goods and services, public authority current expenditure on goods and services, Gross Domestic Capital Formation, and changes in stocks. If the level of energy consumption were related to personal expenditure on consumer goods and services only, it would be a much higher percentage.

Of this total, about 36 per cent is spent on electricity, about 58 per cent on oil products, 4 per cent on coal and 2 per cent on gas.

Another indicator is the value of new capital expenditure. Over the whole energy sector about $130 million is spent in new capital formation each year, which represents about 13 per cent of all fixed capital expenditure in New Zealand. About 75 per cent of this is used for electricity although, again, this is a rough figure and with the construction of less capital-intensive thermal stations and the high expenditure on the production and transport facilities for Maui gas the proportion going to electricity will fall.

I have given here some figures showing that expenditure on electricity is quite high, 75 per cent of capital and 36 per cent in revenue. The volumes of energy used, though, are quite different. Oil products take up about 59 per cent of the consumer energy market, coal about 17 per cent and dropping annually, and electricity about 22 per cent and increasing quite rapidly, with manufactured and natural gas each taking about 1 per cent.

While the majority of the capital expenditure for oil supply is made outside New Zealand heavy local investment is required for electricity. Yet coal, an indigenous fuel, has, historically, a very low capital outlay with large expenditures on labour, although this pattern is changing. Similarly each fuel, each with its own characteristics, has its own particular advantages in use. Thus when both costs and convenience are considered it becomes difficult to ascertain the relative merits of the various fuels.

However, it is obviously worth some effort to investigate, first, whether the present pattern of use diverges much from the most desirable usage and, if so, what to do about it.

It should be pointed out, too, that while the percentages of fixed capital formation and Gross Domestic Expenditure are not large, the rate of increase of energy use, particularly electricity, is well above the annual increase in Gross National Product. This will mean that, if present trends continue, an increasing demand will be made on resources of money, manpower and materials to satisfy the market for electricity, and again this needs investigation and watching.

Sources of Energy

We might do well to look at what indigenous resources we have left available to us. At present the installed hydro system totals about 3400 MW, and another 1500 MW is expected to be installed in the next 10 years.

The amount possibly available beyond this has been variously estimated at between 4½ thousand and 10 thousand MW, but a large proportion would be expensive and, indeed, uneconomical by present-day standards and also much would only be available in small stations. Many, too, might well at present be regarded as environmentally unacceptable. However, shortages and cost increases of other forms of fuel could well bring these into the picture again.

There is, of course, some potential in geothermal fields but, again, lack of size makes these unattractive for electrical generation at present and, in fact, detailed investigation on geothermal fields has been cut back. Fortunately, however, our geothermal engineers and scientists are in demand overseas and their expertise will be available, and will enable us to carry out further developments in the future.

We have a good many millions of tons of coal reserves in areas in the Waikato, West Coast and Southland, and reappraisal and new investigations of these will continue.

We can hardly even guess at the extent of our oil and gas reserves but exploration continues and there appears to be continuing competition for prospecting licences. For overseas supplies of oil we are in the same position as many other countries and will have to compete in world markets.

Nuclear power must be considered as a possible source of energy in our future, although the decision to develop the Maui field has pushed this prospect outside any immediate planning horizon. Given the reports from overseas of technical and environmental problems, then it is useful to have time in hand while these are ironed out.

Various other potential power sources, some of which are extremely vast, exist, of course, but these must be considered to be very long term as they have not yet begun to be tapped.

Thermonuclear generation is currently the subject of intense research but it seems unlikely to come into service for at least a further 20 to 30 years. This source has the advantage of using an abundant fuel and avoids much of the radiation problem of nuclear fission. It does, however, have the problem of extensive discharges of waste heat, although here opportunities exist for the development of total energy systems, using this waste heat as a heat source elsewhere.

Direct energy conversion, as in fuel cells, is a very attractive method of utilising the energy in fuels. It combines the flexibility of electricity with the efficient use of the fuel by bypassing that fundamental sticking point, the second Law of Thermodynamics, which afflicts all thermal power plants.

However, we seem to be a long way from large-scale power plants using D.E.C. as yet.

Another method making more efficient use of conventional fuels is Magnetohydrodynamic generation, where the electrical properties of a high temperature particle stream are utilised for the creation of electric current. This is proposed for use with a conventional steam station giving very high overall efficiencies.

A variation on the use of geothermal steam, as at Wairakei, is the creation of artificial steam fields. This entails the drilling of wells and the injection of water at strategic points utilising the heat within the earth's crust. As yet, however, the cost of this process is prohibitive, and the structure of the crust not well enough known for any commercial development. Several electric power stations have been set up harnessing the energy of the tides. This method has its limitations though, and there are few suitable sites.

Solar energy is the fundamental source of most of our energy at present and it would seem an ideal prospect to utilise this energy directly. Methods such as this have the advantage that they do not put more heat into the environment than was originally present.

Although some degree of success has been obtained, as with solar water heating, large collecting areas are required, and unfortunately the incidence of solar radiation is least on the areas of the earth which tend to require the greatest amount of heat.

I must emphasise that most of these prospects are very long term and we cannot take account of them in formulating our energy plans.

While we do not appear to be too badly off for supplies of energy for more than a decade, careful planning and use in order to maximise our benefits is indicated. Bearing in mind the economics of energy supply in New Zealand, the somewhat limited resources, natural, technical and financial, we have with which to compete and the rapidly increasing demands it had been apparent for some time that there was a need for a co-ordinating Ministry within Government.

Ministry of Energy Resources

The Ministry of Energy Resources was established by Act of Parliament in 1972 to, among other things, "Promote and Co-ordinate the efficient and economical production, supply, distribution and use of energy within New Zealand, having proper regard to:

- (i) The need to conserve our energy resources; and
- (ii) Social considerations; and
- (iii) Any effects of such production, supply, distribution or use of energy on the environment."

Thus the Ministry has a prime function at the centre of the energy sector in advising on the trends in demand for energy in all its forms and on the best ways of meeting this demand. This includes:

- (i) An assessment of all resources, including manpower, materials and money, available to meet that demand.
- (ii) An analysis of fuel costs to allow a proper understanding of:
  - (a) costs to consumer,
  - (b) national costs.
- (iii) Definition and analysis of competitive areas.
- (iv) Elasticity of demand and other factors influencing consumer choice of fuel.

Energy Pattern

The historical pattern of energy demand over the post-war years in New Zealand has been one of steady growth, both in absolute and in per-capita terms, with the convenient fuels, petroleum products and electricity, and, potentially, natural gas increasing their share of the consumer energy market at the expense of coal. This trend has been accelerating in recent times as people demand more comfort, greater convenience and more elaborate facilities and equipment.

Electricity is providing an increasing proportion of domestic energy requirements in "all-electric houses", and, in fact, around 50 per cent of all electricity is used domestically. Also the steady increase in the number of private cars and transport vehicles with their demand for motor spirits has markedly influenced total demand for oil products with over half going to transport.

The large fraction of energy used domestically is a reflection of New Zealand's high standard of living combined with a low industrialisation. However, industry has played its part and the virtual dominance of electricity for stationary motors and the dieselisation of the railways have contributed to the general overall trend towards more convenient fuels and is increasing its consumption at a greater rate than are domestic consumers.

As recently as 1950 oil and electricity combined contributed less than half of New Zealand's energy requirements while today they hold well over three-quarters of the market between them. They appear likely to continue to increase their share although probably at a lower rate as coal becomes confined to certain large users who are equipped to use it efficiently and economically. Thus coal, although maintaining fairly constant sales, will probably take a declining share of an expanding consumer energy market. Nevertheless, its use as primary energy for electricity generation is likely to increase coal consumption very substantially.

Present Planning Systems

Data on demand for fuel and power has been recorded in national statistics or industry records, and in both the oil and electricity industries the processes of forecasting are well established. Certainly each has prepared its annual forecasts and plans and these appear to have ensured that demand has been met in all parts of the fuel and power sector.

However, deficiencies in the basic data become apparent when these are put together in an overall forecast of demand for energy and the Fuel and Power Council of the N.D.C. suggested in 1969 that the aggregated forecast may have been optimistic. Up till now, the electricity, oil, gas and coal industries have made their forecasts separately in a spirit of competition without regard to the growth of the industry as a whole. This competition is based largely on the relative prices of fuel to the consumer, rather than the real national cost, and on consumer convenience.

Market research into consumer preferences or analysis of the various classes of consumer is largely unco-ordinated between the various industries and up till now there has been no research into which way energy demand might best be met or how the demand should or could be modified. The demand has merely been estimated for the particular industry and planning follows these projections.

However, now with the formation of the Ministry of Energy Resources we have the opportunity to establish what the total energy demand will be and how it can be met to the overall national benefit taking into account all social and economic factors. This entails, as well as choosing the fuel which fulfils a particular purpose best, the promotion of the efficient use of fuels and means of prevention of undue wastage.

Although there is considerable usage where various forms of fuel do not seriously compete such as lighting and transport, competition is strong in the important areas of industrial and domestic heating, and is becoming even more so with the increasing trend towards whole house heating. In the domestic case particularly, it would appear that choice of fuel is based largely on consumer convenience, and, to some extent, on capital cost, and, to a lesser degree, on fuel price.

Much more research is necessary to establish the real costs, both economic and social, to the community of using the various forms of energy particularly where substitution is possible.

In the capital-intensive fuel and power sector, where most expenditure is long term and often involves choosing between local and imported fuels or equipment, it is especially important that further capital development is based as far as possible on these real costs. If the maximal choice is not made, the additional cost must be met ultimately by the consumer or the country as a whole.

Conservation

We have a steadily increasing demand for energy in its various forms, the fastest increases being in the more convenient forms such as electricity and oil products. While the community demands increasing amounts of energy, it is not always happy about the various adverse effects, whether in the end use of the fuel or in the production of it — for example, coal fires for domestic use or the construction of thermal power stations near cities.

It must be remembered, however, that the growth of the energy industry is inextricably tied up with the desire for higher standards of living. We must face up to the fact that any material benefits cause natural disturbances to some degree or other and it is necessary to strike a balance between the benefits and any adverse consequences.

As an example of rapid growth in energy usage, we have electricity, which is so ubiquitous in our society, growing at about 7 per cent per year, as opposed to the annual increase of about 4 per cent in our G.N.P. We are at present in a situation where hydro sites are limited and the best involve quite drastic changes in the areas nearby. Supplies of fossil fuels are not everlasting and concern is expressed in some quarters at the nuclear alternative.

Concern about the wasteful use of resources in the face of increasing demand for comfort and convenience by affluent societies has led to various proposals for encouraging conservation of energy rather than accept its unlimited and unrestricted use.

There is no doubt that, for the sake of convenience, energy is used more extravagantly than it need be and some thought must be given to ways of slowing demand by reducing this wastage. One way, which is obviously neither popular nor fair, is to charge customers for energy in such a way that they would be forced, by their own economic circumstances, to avoid waste.

It is considered by others that there are no grounds for claiming there was a waste if the consumer paid a proper price for the fuel he used. The problem is, of course, to determine what this proper price is, since it must include many factors, including the social and environmental cost. This area is at present being investigated by the Ministry, in order to quantify these social costs, in so far as it can be done.

A major problem is to quantify such social factors as an unobstructed skyline or the preservation of a particular local industry.

The Ministry's role in conservation lies in its advisory capacity to Government. While we do not have the power to decide what shall be conserved and what used, we do have the role of analysing all courses of action available and presenting the costs, economic, social and environmental, of each alternative.

Conservation does not mean just conservation of the environment or of physical resources such as coal or gas but includes technical and monetary resources as well. It is well recognised that, in order to make a sound decision on which of several alternatives to follow an assessment is necessary of the cost of each of these. Only then is it practical to weigh up the relative merits of various proposals.

Since the economy has only limited resources, if we follow one course of action which involves a project at greater cost than a similar project following a differing course, then obviously some sacrifice must be made elsewhere. Thus the benefits, monetary, social or otherwise, accrued in the first alternative are considered to have been of greater value than the sacrifices made. This is a decision which of course must be made by the Government on behalf of the public.

In most environmental conservation problems we find that at some stage or other a value judgment must be made as to the worth of the particular part of the environment considered. Our role is to quantify these costs and present to the Government the various alternatives available.

Individual and Regional Considerations

In establishing any energy policy we must recognise that the planning and effects take place at three different levels — individual, regional and national. These three areas of consideration are by no means separate, but are interdependent to a great extent.

Individual assessments of benefit are made on a personal level and are normally made without consideration for the effects on other people. No man is an island, however, and every action taken by one person has an effect, to some degree, on others — for example, through the marketplace or through the physical environment. Despite Adam Smith's guiding hand, the aggregate sum of all the individual consumer decisions to optimise their own conditions may not necessarily lead to the maximal overall benefit without some degree of intervention at the community level.

However, we must remember that the purpose of any community policy is to increase the overall benefits of the individual consumers who, after all, are what the planning is all about. It is all too easy to consider the abstract "community" and forget the people — to lose sight of the wood for the trees, so to speak.

If we take any action at the regional or national level, it is apparent that the fundamental changes must take place at the consumer level. This is since it is the aggregation of the individual consumer's consumption patterns which determines the overall makeup of the energy sector. The levers on consumer behaviour are in general either incentives or regulation. Most people would agree that incentives are a more satisfactory way to get people to act than regulation.

Incentives can be incorporated in the pricing structure where there should be some relation between the price and costs — economic or otherwise.

When we are in this situation, then in theory, when the individual acts to maximise his personal benefit he also maximises the national benefit at the same time. However, as I suggested earlier, the decision a consumer makes is often not based on fuel prices but mainly on convenience and capital cost. Also higher fuel prices could penalise one part of the community and make no appreciable difference to the overall demand.

Consumer education is a powerful incentive. The means for this are available and are being used increasingly. Various organisations, both public and private, are using the media of the press and television to develop a public awareness that home comforts which are taken for granted have a cost to the consumer himself which can be minimised by various means. The motives vary but the public is influenced in this way to change consumption patterns. Our particular concern is to encourage public education along lines that will provide the greatest benefit.

At times, regulation may be necessary. As an example we have the establishment of smokeless zones in which only certain types of fires and certain types of fuel may be used. This is an instance of the inter-relationship between the individuals and regional interests. The community imposes restrictions to reduce atmospheric pollution, while the individual has some of his freedom curtailed.

In some cases a regional approach does not suffice. Taking the instance of the problem of car emissions it is impractical to establish regional policies given the mobility of the motor car and national policies would be in order here.

The ripple control of electric hot water heaters illustrates the relation between local and national interests. The local authorities, in order to minimise their prices, control the operation of water heaters in response to the two-part tariff which in turn has been set to make best use of the large amounts of capital tied up in electric power generation.

Energy Conservation in Buildings

There is a variety of different proposals for the heating of buildings currently under development, both here and overseas, although many of these will not be suitable for use here in New Zealand. But this should not stop building planners from giving consideration to techniques apart from the conventional systems normally used.

One attractive method for more efficient use of energy in buildings, commercial and industrial particularly, is with total energy systems. Instead of considering each of the functions of heating, lighting and other energy requirements separately, they are all considered as a single unit. Then, as stated earlier, the waste from one process will provide the input for another. The most useful example of this is the relationship between electricity generation and heating requirements.

It is well known that only about one-third of the heat generated by the best thermal plants is converted into electricity, the remainder being discharged into the environment. This appears to be a gross wastage, particularly if we then use that electricity for heating purposes. There are, however, many other related arguments in relation to this, but some prospect does seem to exist for the utilisation of this heat to some extent.

An obvious answer is to site the stations near population centres and pipe this waste heat to domestic consumers, or, preferably, in view of the high piping costs, to industrial users of heat. The high costs would appear to be an obstacle to piping heat into cities for general use, and would be greater in the case of old established cities. Nevertheless this type of system is at present successfully operating in several cities around the world.

A variation of this proposal is the setting up of a small generation plant in buildings to provide electricity and feed the waste heat into the heating system of the buildings combined to use one large pump.

A problem exists with this type of system, of course, in that the patterns of consumption of heat and electricity in a building or other environment will often differ quite markedly.

Capital cost is often an inhibiting factor for some heating systems, particularly for small buildings. This draw-back may be overcome to some extent by centralised heating systems where a large central boiler supplies a number of buildings or houses. These systems reduce losses and have a lower unit capital cost, provided the reticulation is not too extensive.

Generally with a heating system the maximum possible heat input is given by the calorific value of the fuel. However, with a heat pump system, the efficiency may be raised considerably above 100 per cent, in other words more energy is put into the building than is contained in the fuel. The remaining energy is obtained from the outside air, that is, the atmosphere is cooled while the building is heated, working much like an ordinary refrigerator in reverse.

While in principle any fuel may be used, for practical reasons electricity is the fuel best suited for this purpose. The capital costs for this system are fairly high, although for large buildings or groups of buildings this should not be an inhibiting factor. Since the process is reversible the equipment can also double as a cooling system in the summer.

The most obvious method of energy conservation in buildings is, of course, insulation, where we prevent the escape of heat by raising the thermal resistance of the walls and ceiling of the building. The savings in fuel costs must be balanced against the cost of the insulation although in general one is a capital cost and the other is an annual cost. Hence some method of equating the two must be decided upon although if the cost of insulation is included in a construction loan the decision is simplified, there it is simply whether the savings in annual fuel costs are greater than the annual repayments for the insulation, although here we run into problems of raising the extra capital required. This of course all requires evaluating before construction begins in order to determine what insulation is warranted, which requires detailed knowledge of the thermal performance of the building in relation to the climate. In general the smaller a building is, the more significant is insulation given the proportionately greater heat loss in the smaller building for the same temperature level inside.

This is the crux of the whole insulation question — the amount of heat retention and fuel savings obtained by installation of the insulation. These are not the same thing. Heat retention will almost certainly rise with insulation, but whether fuel savings will be incurred is another question. This depends largely on the temperature conditions existing in the building without the insulation and on the habits of the occupants. In commercial buildings the results are likely to be more predictable than in domestic houses. Offices are probably heated to comfort level anyhow and are likely to be thermostatically controlled so that improving the heat retention properties of the building is likely to reduce the heat input as the temperature level will most probably remain the same.

In the domestic case we currently have a rather different situation, with limited surveys indicating that the amount spent by householders on home heating is conditioned more by their income than the temperature maintained in their home.

In the majority of houses it is probable that the temperature level is not yet at the optimum comfort level and the occupiers are likely to welcome an opportunity to increase their surrounding temperature. Under these circumstances, in the absence of other influencing factors, raising the level of heat retention is likely to give an increase in ambient temperature, which in itself may be a desirable objective, rather than a decrease in fuel usage. The overall savings in total energy use therefore may be long rather than short term. Any prediction as to likely changes in energy consumption required, therefore, a knowledge of the temperatures already maintained in the home and changes in habits of people after the installation of insulation.

Many of the answers to these problems are likely to come from the "Domestic Electricity Consumers' Survey" the results of which are due out soon. However, the patterns in home heating have changed and will continue to change and we must be aware of these trends.

It is certain that adding insulation to a home will give definite savings if the home is already heated to a comfort level and has thermostatically controlled heating. While savings may accrue under other circumstances, it is difficult to predict these. These savings are likely to come from such factors as not needing heating at marginally cool times since the heat coming from normal activities, such as cooking, may be sufficient to maintain a comfortable temperature. Similarly only one heater may suffice at cool times instead of two otherwise. Thus some energy savings are likely, but the actual benefits are difficult to ascertain.

A further suggestion is that the use of insulation will reduce atmospheric pollution from sources such as the domestic coal fire. However, my department feels that given the poor heating qualities of domestic fires and their lack of controllability this would be a vain hope. Far better results here are likely to be achieved through the promotion of superior combustion techniques.

The points raised here do not question the advantages of insulation from the individual's point of view. Apart from such gains as fuel savings or a warmer home these potential benefits include a more uniformly warm house and a possible reduction in condensation and mould growth.

Other Conservation Methods

There are many ways of more effectively using energy. In suitable areas there is the use of gas directly for cooking, water and space heating in homes as an alternative to electricity generated in thermal stations where some 65 per cent of the heat content of the fuel is lost. However, we must keep in mind other factors such as the relative efficiencies of appliances, transmission losses and the fact that energy supplies now come through two distribution systems in place of one, and the economic arguments associated with this are by no means settled.

It is necessary, too, if gas is to be encouraged to have efficient, attractive appliances available at competitive prices and it is necessary to have such utilities with effective and efficient maintenance services. All these require good engineering support.

In industry, too, there is plenty of scope for fuel conservation by more efficient utilisation and this is linked to good technical advisory servicing availability and maintenance of good equipment and facilities for proper design of plant. An example of what can be done is the Engineering Advisory Service for the dairy industry which has been run for many years by the Dairy Research Institute, and which has introduced procedures for the more efficient use of fuels, e.g., the use of hot water instead of steam for certain processes. Heat recovery from waste-washed water has also been introduced to deal with thermal pollution. The Institute carries out five-yearly surveys and these show that the amount of fuel used per ton of product is consistently being reduced.

Conclusion

To ensure the optimal use of our fuel we must make use of all the technological and planning facilities available to us. In order to ensure that a fuel is used to its maximum efficiency, the existence of various technological processes available must be known to those concerned with their implementation, the architects, engineers and other planners. Only if these people are aware of the existence of these various facilities can we expect them to be used.

Of course technological superiority does not automatically qualify a particular approach as being the optimum. Generally in order to achieve a greater and greater technical standard we must pay a higher and higher cost. Thus we must determine that point at which the benefits and costs balance to attain the most favourable returns. It is no easy task, however, to ascertain the actual costs involved.

It is probably easier to determine those on an individual basis when the fuel and capital costs are given. From the national viewpoint, though, the problems become far more complex. We are then in a situation which involves the definition of areas where any of several fuels can be used, a thorough knowledge of the costs involved, of the elasticity of demand and of what is socially desirable and acceptable.

Only once these factors are determined can we carry out proper planning of development of the means of supply of fuels to meet the national energy demands and the formulation of policies to encourage what is best for New Zealand in using these fuels and other resources.

"Europe excessively dependent on coal imports"

"The possibility of an energy supply crisis in the United States is already causing the American administration to take resolute action," said Mr Derek Ezra, chairman of the British National Coal Board, addressing a luncheon of the Birmingham Chamber of Commerce and Industry on December 5.

"Twice this year they have been obliged to make major relaxations in the controls on oil imports.

"The next startling development was the opening of negotiations with the Societ Union for the importation into the United States and Japan of vast quantities of Russian natural gas at immense expense.

"Finally, one of the first announcements from official sources after the American Presidential election was that Mr Nixon would propose a new energy policy for the United States early next year. When he announced this, the American Commerce Secretary, Mr ePter Peterson, said no presidential initiative would be more important than this one.

"I agree with Mr Peterson," commented Mr Ezra. "No industrialised country can take the slightest chance of not having an adequate or secure supply of energy.

"America's emergence as a huge importer of oil and—possibly—natural gas, will inevitably affect the price that the producers will be able to demand, and may also affect supplies available elsewhere.

"Western Europe already depends to a substantial extent on imports of oil from the Middle East and from Africa. The newly-discovered deposits of gas and oil in the North Sea are certainly valuable, but against the background of the emerging world problem, they are of relatively minor significance.

"The solution must be to preserve all our indigenous sources of energy. In practical terms that means there should be a bridging operation to keep the British and other European coal industries intact and help them through their present difficulties. Such a policy would be no more than a prudent form of insurance against unacceptable risks of high-cost, scarce energy in a few years' time.

"The British coal industry is proving by results that it fully deserves some short-term help," said Mr Ezra.

"Last week's record productivity figures show the resilience of the industry and the determination of the people who work in it to justify the continued national confidence about to be expressed by the Government's decisions on the finances of the industry.

"The aid the unions and ourselves have asked for will prove to be a profitable national investment," Mr Ezra said.

COAL RESPONDS TO CHALLENGE

(Continued from page 5)

heater, recently developed in Britain and accepted for use with bituminous coals in the smokeless zones there. The Rayburn "Smoke Eater" has special application in Christchurch, especially for use with low-sulphur bituminous coals available cheaply. Arrangements are now well in hand for the supply of these heaters to the Christchurch market.

The operation of the Rayburn "Smoke-Eater" is illustrated in the diagram. Air is blown by a small silent fan into the enclosed space above the fire. This air, passing downwards, burns the coal; any smoke emitted has to pass through the hotter parts of the fuel bed and through the combustion chamber at the back of the heater, and is completely burnt to harmless gases. Secondary air from the fan is introduced at the back of the fuel bed to effect this complete combustion.

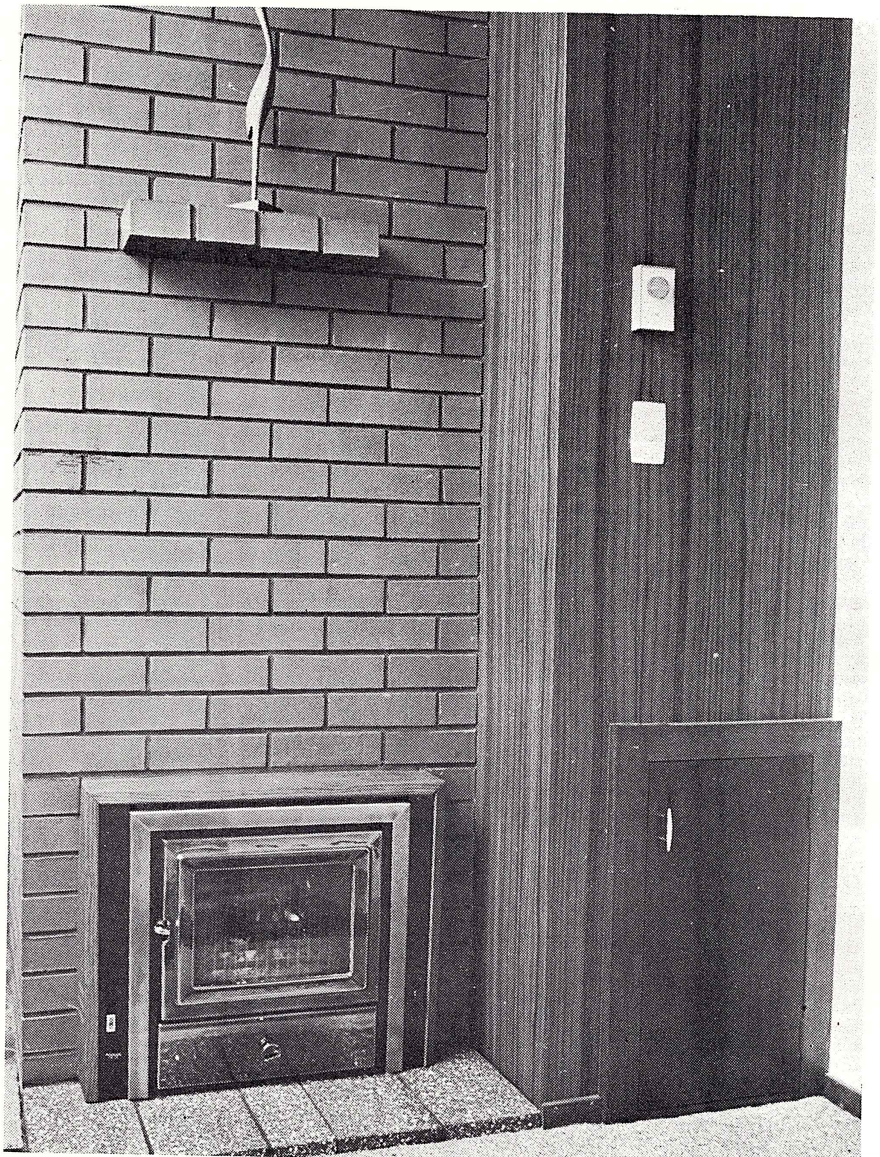
The air is blown into the space between the double glazing of the door. The inner glazing is of strips of glass and air issues through the narrow spaces between these strips. A vertical cast-iron grate contains the coal and prevents it from resting against the glass of the door.

Looking at the heater, we really see the fire from behind the flame front. Rather lazy flames play upwards from the top of the coal but the products of this combustion have to pass downwards through the fire. Some traces of soot collect in the space above the coal, but none of this unburnt material can escape from the appliance without passing downwards through the hot zone and the combustion chamber to the flue. Wisps of smoke, seen passing downwards through the fuel bed, illustrate graphically the basic principle of this down-draught operation.

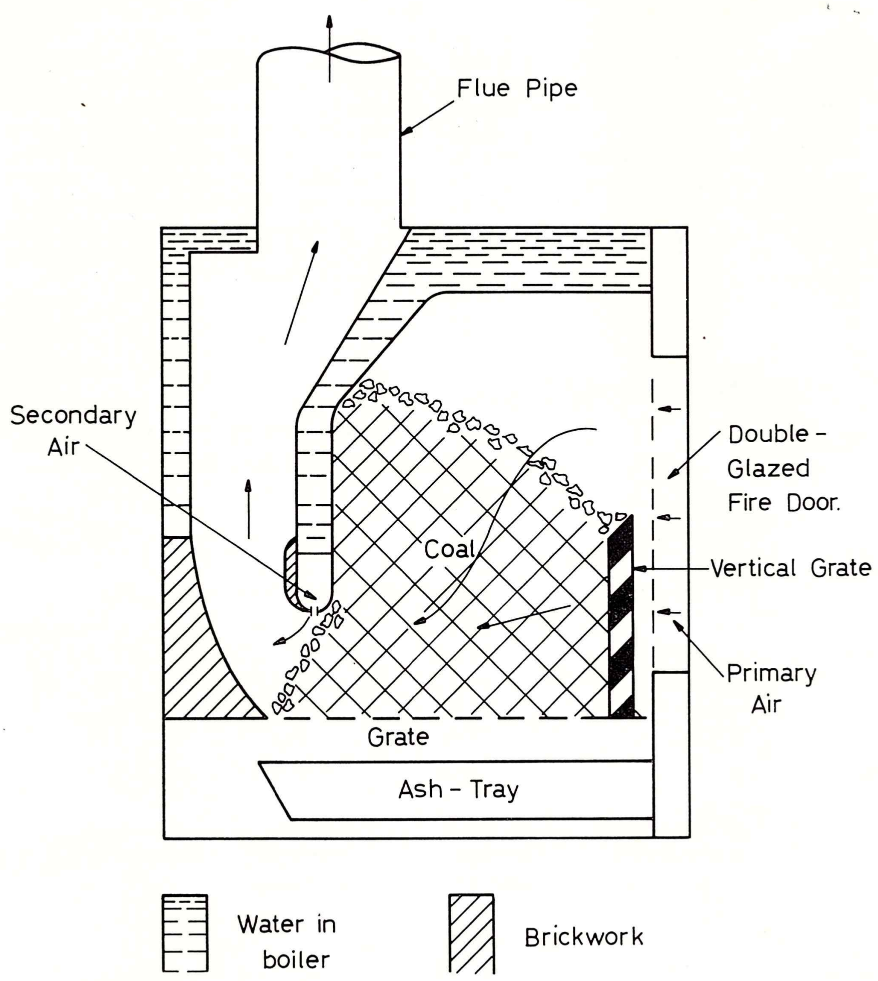
If the householder requires it, the heater can be kept going continuously and the fire need be lit only at the start of the winter. Lighting is a simple process; firelighters are placed on a layer of coal on the grate, and then covered with coal. It takes about an hour for the fire to become properly established, and during this time there is some emission of smoke. When there is a layer of hot coal on the grate, and combustion is established in the back of the heater, the smoke-consuming principle starts to work. Under these conditions, further coal can be added without smoke being emitted.

The Rayburn has two levels of output, depending on whether the fan is switched on or off. The fan can be run manually, or by a thermostat to provide automatic temperature control, or by a time switch to bring it on and off at any pre-selected time.

Mrs L. E. Bankier, first Christchurch resident to install a Rayburn CB 34, receives complimentary flowers from Mr E. H. Lange, president of South Island coal merchants. Mrs Bankier's attractive new home of 1,200 sq. ft. is in Avonside Drive.



Coal in today's home: a Rayburn CB 34 Smoke-eater installed in a Christchurch home. This heater gives smokeless combustion, taking advantage of the low-sulphur bituminous coals available.



RAYBURN CB 34 HEATER

Illustrating the Downdraught Principle.

The heater idles overnight with the fan switched off.

The Rayburn is a space-heater-boiler combination, providing space heating in the room in which the heater is installed, and hot water for the cylinder and for background whole-house heating. The volume of hot water generated is normally too great for the hot-water cylinder, and some radiator system is necessary to dissipate the heat.

HEATAMATIC: A recent development that is attracting a lot of attention, especially in the southern parts of New Zealand is a domstic coal-fired boiler, the Heatamatic, which is used for whole-house central heating as well as for domestic hotwater supply. A hopper is provided, normally on the outside wall of the building, and a screw feeds the coal into the boiler automatically as required. The hopper is generally large enough to need recharging only about once a month. An important factor is the Heatamatic's ability to burn "industrial slack" coal, so much cheaper than graded domestic fuels.

Another attractive possibility is the use of such a boiler in summer time to heat a swimming pool.

OHAI O3MW: The very latest development is the application of the combustion principle of the Heatamatic boiler to the Ohai O3MW, a coal-fired air heater described on page 7 in this issue of "N.Z. Coal". In this case the heat for domestic or industrial central heating is supplied as hot air, which is blown through ducts around the building.

Wet-Backs and Water Heating

Most wet-backs in space heaters are capable of a heat output equivalent to between two and $2\frac{1}{2}$ kilowatts. Their use for heating domestic hot water is becoming increasingly popular especially as threats of power shortages loom.

The theory and practice for wet-backs and water heating were described in the March 1972 issue of "New Zealand Coal", and reprints are available on request from the N.Z. Coal Research Association.

Sometimes the hot water from the wet-back is used for background house heating in radiators, and such natural circulation systems are growing popular, especially in southern parts of New Zealand.

Despite some optimistic claims, there is generally not enough heat available from a wet-back to justify the heating of the hot-water cylinder and radiators at the same time. Perhaps in some cases the radiator can be designed to use the excess heat not acceptable to the hot-water cylinder, which heat would otherwise cause the hot-water cylinder to boil.

Installations

Manufacturers of appliances provide installation instructions for their heaters. Many space heaters are installed in existing fireplaces — the inbuilt ones set back into the fireplace, the free-standing ones generally sitting out in front. An airtight chimney place is a great advantage in ensuring that the appliance has a satisfactory draught. If there is any doubt about this, an internal liner to the flue is generally advisable. For a Juno heater, turned down overnight with its magazine containing coal, an airtight flue is important.

In a house that has no chimney, a steel flue generally lined with pumice concrete is becoming popular.

Central Heating

"Central heating" often loosely refers to an installation that has an output rather higher than is necessary for one room, and provides for the heat to be distributed throughout the house simply by leaving doors open. Thus oil-fired home heating that has the heat liberated at one spot is often called central heating, but central heating must imply some definite distribution of heat around the house, by hot water in pipes, or as hot air in ducts. The Juno heater can provide this so-called central heating effectively, in some installations the practice has grown of installing grilles above doors and below ceiling level to promote better distribution of heat around the house.

Coal-fired units can now provide **bona fide** central heating systems — through the Heatamatic hot-water boiler and the Ohai O3MW for a hot air ducted system.

Comparative Costs

To the householder, the cost of fuel required for a certain standard of heating comfort is all-important. The price of the various fuels inevitably varies in different parts of the country; electricity and fuel oil prices are relatively uniform, but gas prices and coal prices show much more variation. Again, costs may depend on the quantity purchased and on the way in which the fuel is delivered.

Quantities of fuel, and their cost, may be expressed in a confusing variety of terms, and the various quoted figures are generally converted to a comparable basis of therms and cents per therm. (One therm equals 100,000 Btu's or 29.3 electrical units, kWh). However, the householder is interested not so much in the therms he purchases as in the therms from which he gets the benefit, as determined by the efficiency of the appliance.

Because common fuel costs cannot be specified for the whole of New Zealand, it has been thought better to illustrate the method of comparing various costs of effective heat, using an assumed set of figures. These figures can then be modified to suit the conditions obtaining in any area — it is just a matter of substituting the local figures.

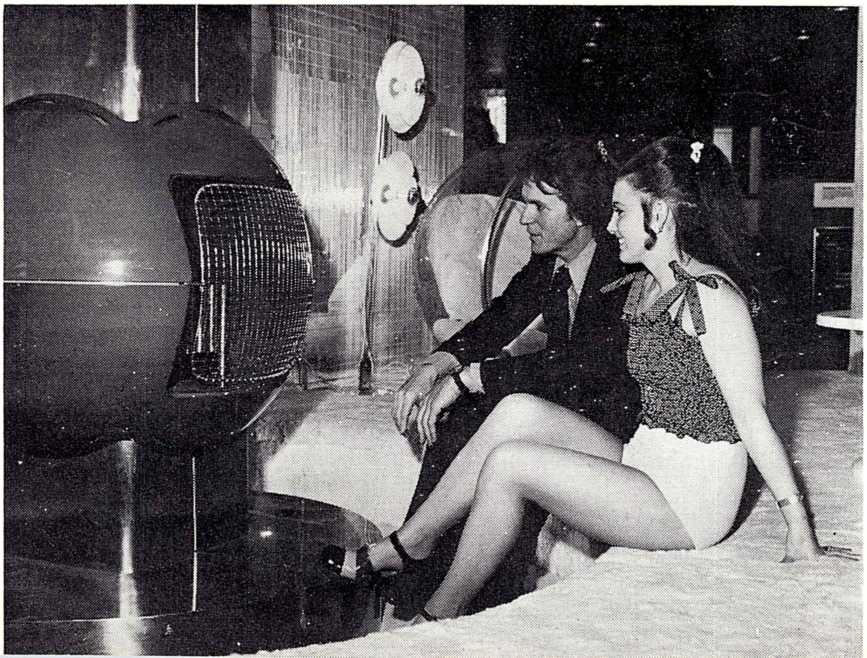
These calculations are shown in these tables:

SPACEHEATER DETAILS

HEATER	MAKER	TYPE	RETAIL PRICE	MINIMUM INSTALLATION COST	WET-BACK EXTRA COST
New Wonder No. 1	Mayo, Auckland	Inbuilt	$160	$25	$29
No. 2	,, ,,		$183		
New Wonder No. 1	,, ,,	Free-standing	$166	$25	$29
No. 2	,, ,,		$209		
Fulvue	Gillies, Oamaru	Inbuilt	$159	$45	$12
Warmrite	,, ,,	Free-standing	$175	$30	$12
Empress	,, ,,	Inbuilt	$204	$30	$12
Juno	,, ,,	Free-standing	$239	$30	$29
Belmac	Southland Heating Co.	Inbuilt	$179	$40	$16

Fuel and Appliance	Unit cost	Cost per therm, as purchased cents/therm	Thermal Efficiency percent	Cost as utilised cents/therm	cents/kWh
Coal (10,500 Btu/lb):					
— Down-Draught Space Heater	$1.50 per 140-lb bag	10.2	70	14.6	0.50
— Space Heater	$1.50 per 140-lb bag	10.2	50	20.4	0.70
— Open Fire	$1.50 per 140-lb bag	10.2	25	40.8	1.39
— Heatamatic	$10 per ton	4.3	65	6.5	0.22
— Ohai O3MW	$10 per ton	4.3	65	6.5	0.22
Electricity	1 cent/kWh	29.3	100	29.3	1.00
Domestic Fuel Oil (1.64 therms/gal)	23 cents/gal.	14.0	65	21.6	0.74
Gas (natural gas) (100c.ft. = 1.1318 therms	$2.74 for 600 c.ft.	40.1	75	53.5	1.83

Mrs Margaret Dominiak, reigning British Coal Queen, takes a look at "Blue Ball" on the National Coal Board solid-fuel stand at the Ideal Home Exhibition, London. "Blue Ball" is one of the modernistic coal-burning fireplaces designed by Jon Bannenberg, pictured here with the Coal Queen. Regal comment: "You've got some great ideas!" Jon's reply: "I set out to make these fireplaces as interesting as a painting or a sculpture — not just a support for family knick-knacks."



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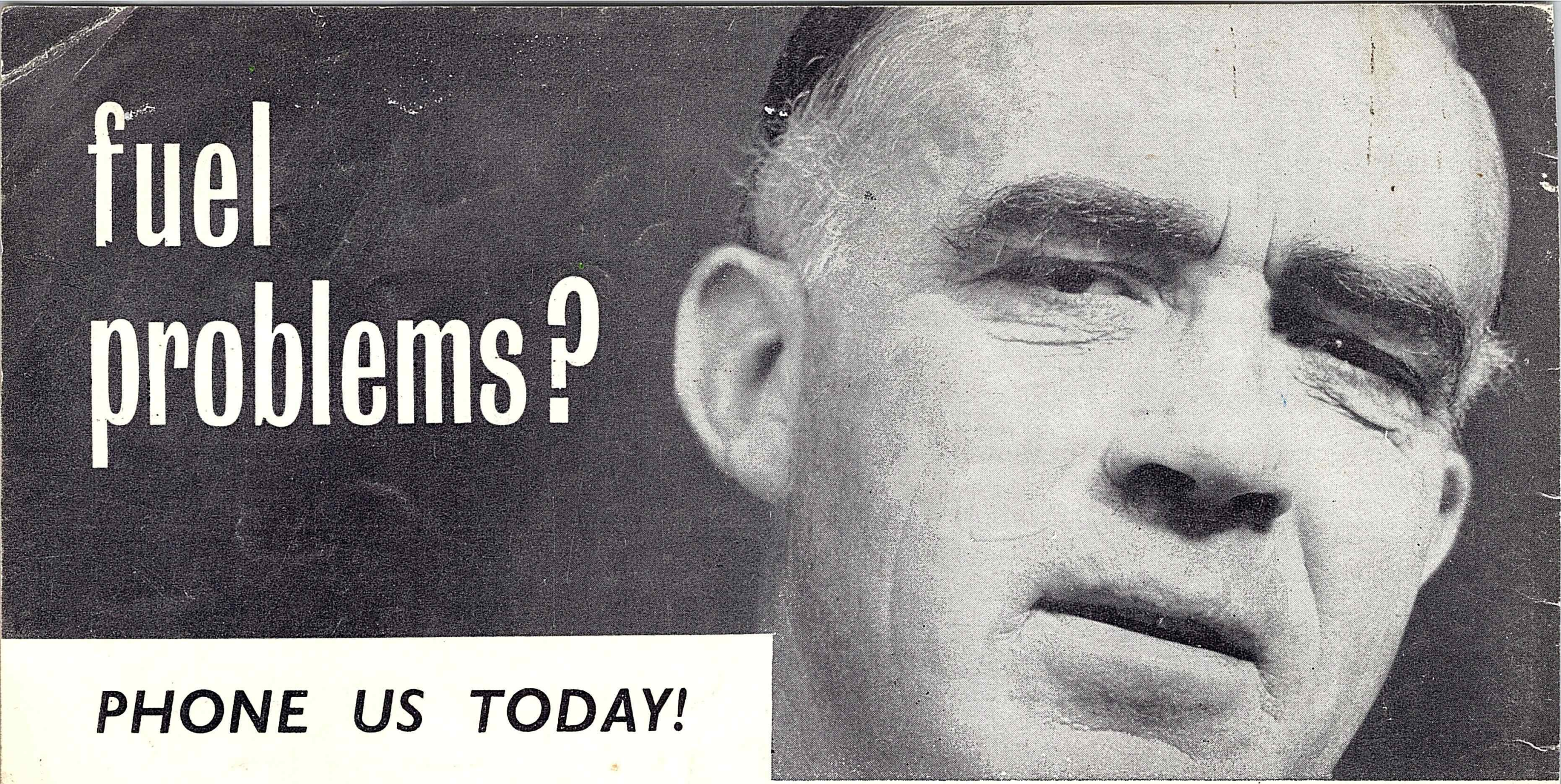

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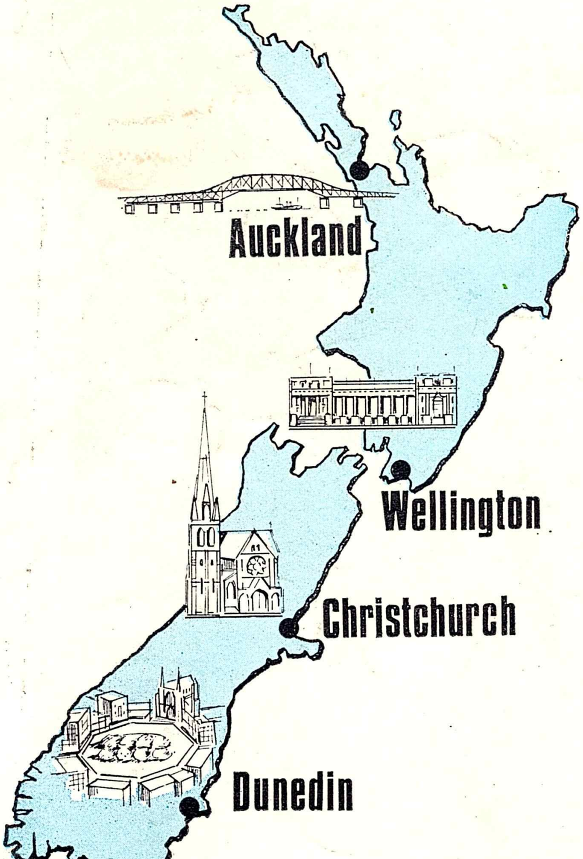

The fully qualified Fuel Technologists of the coal industry in New Zealand are readily available to Architects and Consulting Engineers planning for new or additional boiler plant. Their services are free and they will travel when necessary to any part of New Zealand for on-the-spot inspections. When you wish to obtain complete and up-to-the-minute information on the latest technological advances in coal burning, firing and storage, simply phone or write to your nearest coal industry Fuel Technologist.

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